THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVIII. No. 442—21st YEAR.] LONDON, SEPTEMBER 28, 1869. [Subscription { 15s. in Advance / 18s. Credit } DOUBLE No. Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—
10,000 cubic feet of gas per ton of coal.
26-candle gas.
13¼ cwt. coke per ton of coal.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828.
FIRE-BRICK WORKS, established 1804.
FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire Clay.
The Fire Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article.
The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GEORGE GLOVER & CO.,
Patentees of the Standard Gasometers for the Government, and of the
IMPROVED DRY GAS-METERS.
These Meters are warranted to measure correctly and not to vary, and have come into general use more rapidly than any Meters hitherto manufactured.

PARIS EXHIBITION, 1867.
THE TESTING-HOUSE REPORTS.
The Reports prepared for the Science and Art Department, under the direction of the Lords of the Council, detail the arrangements made for testing the gas apparatus exhibited. In the testing-house erected by the Special Committee appointed to further this object a gasholder was constructed by Mr. G. Glover, being a *fac simile* of that produced and patented by him in 1860, and deposited in the Exchequer, under the provisions of the Sales of Gas Act, and British manufacturers of gas apparatus were invited by advertisement, and by direct application, to forward worthy objects for exhibition. Mr. G. Glover was, however, the only manufacturer who sent Meters to be tested. The report states that, as "Mr. Glover is a manufacturer of Dry Meters only, no opportunity presented itself of comparing their accuracy with that of Wet Meters under various circumstances, but the perfection to which that maker has brought his Meters prevents the possibility of those extravagant errors which are well known to exist where Wet Meters are used."
Particulars and lists of prices forwarded on application to Ranelagh Works, Ranelagh Road, Pimlico, LONDON, S.W.; 15, Market Street, MANCHESTER; or 97, Boulevard de Magenta, PARIS.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

FIRST PRIZE IN THE PARIS EXHIBITION.
JOHN RUSSELL AND CO.,
THE OLD TUBE WORKS,
CHURCH HILL, WEDNESBURY;
ALMA WORKS,
WALSALL, STAFFORDSHIRE;
and 69, UPPER THAMES STREET, LONDON,
Original Manufacturers of Wrought-Iron Gas Tubes and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.
Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.
N.B. All Goods thoroughly Tested before sent out, and Warranted.

JOHN BENT & SON,
WET AND DRY GAS-METER AND STREET-LAMP
MANUFACTURERS,
BELL BARN ROAD, BIRMINGHAM.
ESTABLISHED 1830.
All materials found for the alteration of Public Lamps for lighting with the Rod. Regulators with Lava Burners.

BLAYDON BURN AND LOW BENWELL FIRE-CLAY RETORT AND FIRE-BRICK WORKS,
NEAR NEWCASTLE-ON-TYNE.
WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.
London Agents: JAMES LAWRIE & CO., 63, OLD BROAD STREET, CITY, LONDON.

THE "LOTHIAN" CANNEL COALS.
These Cannels are extensively used in the Gas-Works of Edinburgh, where the illuminating power of the gas is the highest in Britain.
The yield per ton is 12,573 cubic feet; illuminating power 33·8 standard candles; coke per ton 1046 lbs.
Ports of Shipment, in the Firth of Forth.

BO'NESS CANNEL COALS.—This Cannel is largely used in gas-works where, in addition to high illuminating power, there exists a demand for superior Coke, it being the best Coke-producing Cannel of all Scottish Cannels. It yields about 11,000 cubic ft. of 25 standard candle gas per ton.
Ports of Shipment, either the Forth or the Clyde.
Apply to J. and W. ROMANS, 53, Frederick Street, EDINBURGH; & 1, Walbrook, Mansion House, LONDON.

NOTICE.
LESMAHAGO GAS OR CANNEL COAL.
JAMES FERGUSON & CO., Auchinheath COLLIERY, LESMAHAGO, and the NITSHILL & LESMAHAGO COAL COMPANY, AUCHINHEATH AND SOUTHFIELD COLLIERIES, LESMAHAGO, sole Proprietors and Producers of the above celebrated GAS COAL, beg to intimate to Gas Companies and other consumers that, having reason to suspect that Cannel or other Coal of very inferior quality, both as regards the quantity and illuminating power of the Gas, has frequently been mixed with and sold under the name of "Lesmahago," they have now appointed Messrs. JAMES LAWRIE & Co., of 63, Old Broad Street, LONDON, E.C., sole agents for England; and Messrs. LA COUR & WATSON, of LEITH, sole agents for foreign markets; and, in order to prevent a recurrence of the frauds named, they request that all purchasers will send their orders through the above-named firms. Orders for other than the above-named markets may be forwarded direct to either of the Proprietors.
The Proprietors will, in future, use their own forms of bills of lading, and also issue certificates of origin, signed, as the case may be, either by JAMES FERGUSON & Co., or by the NITSHILL & LESMAHAGO COAL COMPANY; and they request all consumers purchasing Lesmahago Coal to demand such a certificate for each cargo, and to observe that it corresponds with the bill of lading.
Auchinheath, Lesmahago, March, 1868.

MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."
THE IMPERIAL TUBE COMPANY, BIRMINGHAM,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS, BRASS & COPPER TUBES,
GALVANIZED & GLASS ENAMELLED TUBES & FITTINGS,
LAP-WELDED IRON & BRASS BOILER-TUBES, ETC., ETC.
☞ Sole Makers of "HUGHES'S PATENT TAPS," Strongly recommended for all High-pressure purposes.—Price List and Testimonials forwarded on application.

CROLL'S DRY GAS-METER,
PRIZE MEDALS. LONDON, 1851; NEW YORK, 1853; PARIS, 1855.
(INVENTED & PATENTED IN 1844,)
COMBINING ALL THE LATEST IMPROVEMENTS,
MANUFACTURED ONLY BY
PRIZE MEDALS. LONDON, 1862; DUBLIN, 1865; PARIS, 1867.
THE GAS-METER COMPANY, LIMITED.
238, KINGSLAND ROAD, LONDON, N.E.
A. ANGUS CROLL, C.E., Chairman. GEORGE RAIT, Managing Director.

JOURNAL OF GAS LIGHTING NEWSPAPER

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS,

OLD HILL, near DUDLEY,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES & FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS for IRONFOUNDERS, STOCKS, TAPS, & DIES, IRON COCKS, &c.

London Agents { W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.
J. R. HILL, 73, Hatton Garden, E.C.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short notice.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

For Gas, Steam, Water, &c.

SOLE LICENSEES for the United Kingdom for the LAVENANT PATENT ENAMELLED TUBES & FITTINGS,

the Coating of which does not shell off, is a certain preservative from rust, and resists all effects of expansion and contraction.

LAP-WELDED IRON & HOMOGENEOUS METAL TUBES

For Locomotive, Marine, and Stationary Boilers.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

London Offices: No. 4, Cloak Lane, Queen Street, E.C.

WAREHOUSES:

LONDON: No. 157, Upper Thames Street, E.C. LIVERPOOL: No. 4, Cooper's Row, and 3, Crooked Lane, Strand Street.
MANCHESTER: Barlow's Croft, Chapel Street, Salford. PARIS and LILLE.

BEST AND HOLDEN'S

PATENTS FOR CHARGING AND DRAWING GAS-RETORTS,

WITH CHAMBERS FOR MOUTHS,

REQUIRING NO LUTING.

Gas Engineers are solicited to examine into the merits of this invention before erecting new or altering old retort-houses. It may be seen in action at the Alliance Gas Company's Works, Dublin, where its utility and economy will be clearly demonstrated. Although the saving in labour will be considerable, and quickly return any outlay of capital, there are other and important features strongly recommending its adoption at all gas-works, and which a gas engineer upon examination will at once appreciate.

The Directors of the Alliance Gas Company have kindly consented to give every facility to gentlemen desirous of seeing the invention in operation. Parties, therefore, about to visit Dublin will be so good as to send us their card, and we will furnish them with letters of introduction.

Drawings, &c., may be seen at our Office, and all details explained.

JOHN CHISHOLM, SON, & CO., 44, MARK LANE, E.C.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over seven years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

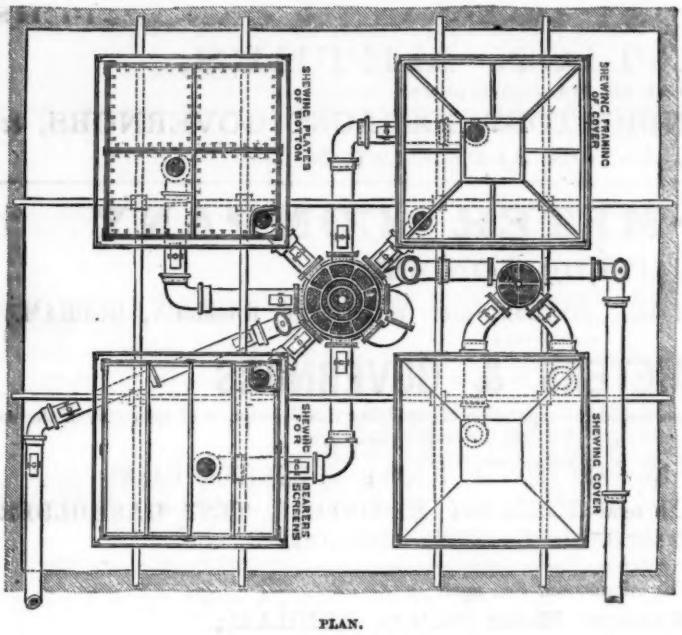
Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

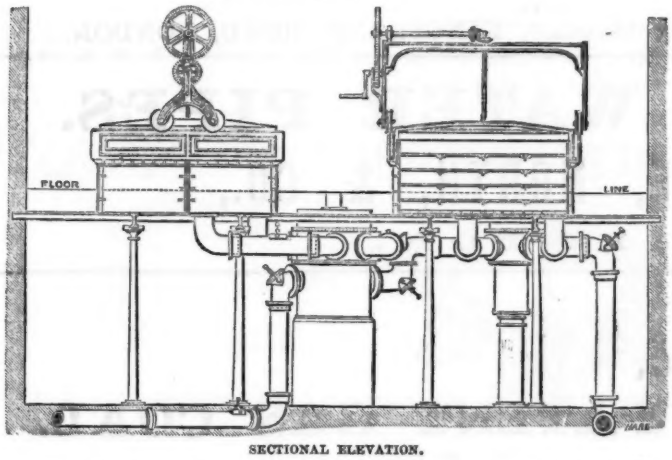
A PLAN & ELEVATION OF GAS PURIFIERS

WITH

COCKEY'S PATENT VALVES.



PLAN.



SECTIONAL ELEVATION.

DESCRIPTION OF PURIFIER ARRANGEMENT.

The plan shows four Purifiers: three of them are worked in rotation by means of a central Valve, so that two are always in use, and the third always out of use for cleaning. By another arrangement of the Valve, either one, two, or three Purifiers may be used together.

The fourth Purifier is used as a guard, with a separate Valve, and is useful in preventing any slightly impure gas, which may have escaped in turning the central Valve, passing in that state to the gasholder.

This system has been found to work well in many gas-works, and in addition to the advantage before stated, it affords a ready and convenient mode of using oxide and lime together for purifying.

By the introduction of a bye-pass, the system is made more perfect, inasmuch as the central Valve, with its connected Purifiers, may be shut off for repair, and the gas passed temporarily direct to the fourth Purifier.

The Valves which are here introduced have now been in use for more than ten years, and have been tested in sizes varying from 3-inch to 16-inch. The increasing demand for them is the best proof which can be given of their satisfactory working and general usefulness.

More than 350 of them have been fixed. They are suited for various parts of gas apparatus, and are especially available for bye-pass connexions. They are also introduced with much advantage for the inlet and outlet connexions of gasholders, and simplify very much the changes where more than one gasholder is in use.

They are durable and easily reground without removal from their connexions, and in a few hours they may be made as good as new after many years wear.

The patentees are prepared to furnish plans, specifications, and estimates, either for the entire construction and erection of gas-works, or for the rearrangement of any part of the apparatus. The Valves are manufactured at the works, at Frome, where also Gasholders, Purifiers, Steam-Engines and Exhausters, Governors, and all other descriptions of Gas Apparatus are made and supplied.

EDWARD COCKEY & SONS.

THE IRON-WORKS, FROME SELWOOD,

March 1, 1869.

TO GAS COMPANIES.

WANTED, an appointment, as MANAGER or SECRETARY, by a person who, in addition to the manufacture of gas and its distribution, is capable of taking the management of main and service-pipe laying and erection of fittings. Testimonials as to character, &c.

Address T. Layton, Gas Office, Redditch.

TO MANAGERS OF GAS-WORKS.

WANTED, by a young Man, a situation as METER-FIXER, INDEX TAKER, &c. Willing to make himself useful.

Address P. P., care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TO MANAGERS OF GAS-WORKS AND OTHERS, TOWN OR COUNTRY.

A Man of good experience is in want of a situation as METER INSPECTOR or FITTER. Good references.

Address J. P., 7, Pleasant Row, Stepney Green, London, E.

TO SECRETARIES AND MANAGERS OF GAS-WORKS.

A thoroughly trustworthy and con-fidential young Man, of literary ability, wishes to offer his services as CORRESPONDENT, or to prepare MSS. upon gas subjects, &c., copy and punctuate writings, and make himself otherwise useful as messenger, &c.

A. Z., Post-Office, North Street, Pentonville Road, King's Cross.

CLAY RETORTS.—TENDERS WANTED.

THE Burgess Hill and St. John's Common Gas Company, Limited, require CLAY RETORTS.

Tenders to be sent to the Secretary, at the Office of the Company, St. John's Common, Hurstperpoint, on or before Oct. 1, 1869, stating prices for the various sizes delivered free per London and Brighton Railway to Burgess Hill Station.

TO PIPE-LAYERS.

THE Directors of the Canterbury Gas and Water Company are prepared to receive TENDERS, Contract No. 8 B, for the earthwork, carting, laying, and jointing, &c., of about 16,300 lineal yards of cast-iron SOCKET-PIPES, varying from 7 in. to 3 in. internal diameter, together with the required screw-cocks, hydrants, and other apparatus and appendages connected therewith.

The specification, particulars, and form of tender may be seen, on and after Monday next, the 27th inst., at the Office of the Company, Castle Street, Canterbury, and at the Office of Mr. S. C. Homersham, 19, Buckingham Street, Adelphi, London, the Engineer to the Water-Works.

Sealed tenders, endorsed "Tender for Pipe-laying —Contract No. 8 B," to be addressed to the Secretary, and delivered at the Company's Office, Castle Street, Canterbury, on or before Thursday, the 7th of October next. The directors will meet the following day, at Ten a.m., to consider the same, but do not pledge themselves to accept the lowest or any tender.

By order,

James Burch, Secretary.

Secretary's Office, Gas and Water Works, Castle Street, Canterbury, Sept. 17, 1869.

BOROUGH OF BARROW-IN-FURNESS.

TENDER FOR GAS COAL.

THE Gas Committee invite Tenders for the supply of about 3000 tons of CANNEL and GAS COALS, to be delivered at their works in such quantities and at such stated periods as may be required, from Jan. 1 to Dec. 31, 1870.

Further particulars may be obtained on application to the Manager, at the Gas and Water Works.

Sealed tenders, addressed "The Chairman of the Gas and Water Committee," to be sent in to me not later than Sept. 30, 1869.

Wm. Thos. Manclarke, Town-Clerk.

Dated this 16th of September, 1869.

PURIFIERS FOR SALE.

A Set of Four Cast-Iron Purifiers, 8 ft. square, with wrought-iron lids, wrought-iron centre-valve in cast-iron case, wood sieves, connecting-pipes, and lifting apparatus complete, and nearly new.

If preferred, Cockey's patent centre-valve, or cast-iron sieves, in place of above.

For particulars, apply to G. Porter, Manager, Gas and Water Works, Carlisle.

PHŒNIX GASLIGHT and COKE COMPANY.

NOTICE is hereby given that the adjourned HALF-YEARLY GENERAL MEETING of PROPRIETORS, holding previous to Midsummer last £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 6th proximo, at Twelve for One o'clock, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 30th of June last, and on other business.

And notice is hereby further given that the said meeting will be made special, for the purpose of making a call of 5 per cent. upon the new stock, payable on the 1st of November next.

By order of the Court of Directors,

Isaac Adolphus Crookenden, Secretary.

No. 70, Bankside, London, S.E., Sept. 22, 1869.

GEORGE NEWTON,

(Late Senior Partner of the Globe Meter-Works,)

UNION STREET WEST, OLDHAM,

MANUFACTURER OF

IMPROVED WET & DRY CONSUMERS GAS-METERS,

GAS STATION-METERS,

With all the Joints planed,

GOVERNORS, GAUGES, INDICATORS, EXHAUST GOVERNORS, &c.

TERMS, &c., ON APPLICATION.

THE GAS-METER COMPANY

(LIMITED), LONDON,

(Successors to CROLL, RAIT, and CO., LONDON, and WEST and GREGSON, OLDHAM.)

MANUFACTURE

STATION-METERS & GOVERNORS

At their Oldham Establishment, which has long possessed the reputation of supplying this description of apparatus of the most perfect construction and appropriate design.

CONSUMERS GAS-METERS IN CAST-IRON & TINNED SHEET-IRON CASES.

STREET GOVERNORS, PRESSURE and EXHAUST REGISTERS, TEST GASHOLDERS,

AND EXPERIMENTAL GAS APPARATUS GENERALLY.

For information, &c., apply to

W. ARCHER, Manager, Meter Factory, OLDHAM;

OR TO

GEORGE RAIT, Managing Director, KINGSLAND ROAD, LONDON.

GAS AND WATER PIPES.

CLARIDGE, NORTH, & CO.,

BILSTON.

M'KENZIE'S PATENT GAS COAL.

This Patent Gas Coal is a compound of Pulverized Coal and Shale Oil. It is now used most successfully by some of the London Gas Companies, and also in Dublin and other places, for increasing the illuminating power of the Gas, which it does at less cost than Cannel Coal. The illuminating power of this Patent Coal can be made of any strength required up to 35 candles, and is in all cases guaranteed. The Coke is of the best quality, as the best Newcastle and Sunderland Coals only are used in the manufacture.

This Patent Coal is shipped at Sunderland, where works for its manufacture have been erected.

Further particulars can be obtained from

W. W. JOBSON, 16, Fish Street Hill, LONDON; or

WALKER, BRUCE, & CO., Patent Gas-Coal Works, South Docks, SUNDERLAND.

EXTRACT *from the Inaugural Address of* THOMAS G. BARLOW, Esq., C.E., *President of the British Association of Gas Managers, at their Fifth Annual General Meeting, held in London on the 2nd of June,* 1868.

Gentlemen,—In considering the progress that has been made in the manufacture and distribution of Gas during the past year, the new inventions and new processes which have been adopted or tried with prospect of success, deserve to be specially noticed. Foremost among them is M'Kenzie's process for producing Gas of high illuminating power from small Coal, mixed with crude Shale Oil. The pressure which the Legislature has recently put on Gas Companies to raise the standard of illuminating power considerably above that obtainable from common Coal, has compelled most of them to use a certain proportion of Cannel Coal, at a heavy loss, and with a diminution in the value of the Coke. The advance in the price of Cannel Coal, consequent on the increased consumption, has stimulated inquiry to find a substitute for it; and this seems to have been accomplished by Mr. M'Kenzie, whose process has been successfully adopted on a large scale at the Alliance Gas-Works in Dublin. The small Coal is well mixed with the Oil, in the proportions varying from 10 to 30 gallons of Oil to one ton of Coals. This is effected by means of a mixing or grinding mill. The Compound material is then distilled in ordinary Gas Retorts of clay or iron, at a strong heat. I have recently witnessed an experiment on a mixture of Llantwit Small Coal shipped at Cardiff, and costing in Dublin 12s. 6d. per ton, with 5 per cent. of Broxburne Shale Oil, costing £5 10s. per ton, the produce of the distillation of one ton of which mixture was—

9750 cubic feet of Gas, 21·5 Candles illuminating power.
37 bushels of good hard, saleable Coke.
2 bushels of Breeze.
11 gallons of Tar.
15 gallons of Ammoniacal Liquor, of 5° Twaddle.

The cost of this mixture, including Royalty, was about 17s. per ton, against 24s. for Wigan Cannel, over which it has the advantage of at least 5s. per ton in the value of the Coke.

HENRY F. WILLEY,

GAS ENGINEERING WORKS,

BARTHOLOMEW STREET, EXETER,

MANUFACTURER OF EVERY DESCRIPTION OF GAS APPARATUS,

Invites particular attention to his

GAS-METER DEPARTMENT,

Where he manufactures both WET and DRY METERS, several hundred of which are in use in many Gas-Works in England, Ireland, and Wales.

These Meters have received the highest praise from many eminent Gas Engineers, for their excellence of manufacture, superiority of workmanship, and accuracy of register. They are warranted to measure correctly and not to vary. Every Meter manufactured by him maintained in perfect repair for a period of *five years*. All bear the Government stamp.

GAS-FITTING DEPARTMENT.

A variety of very beautiful and choice patterns and designs adapted for any character of buildings, including MEDIÆVAL FITTINGS for CHURCHES, &c.; Handsome STAR PENDANTS for ASSEMBLY ROOMS, &c.; CHANDELIERS, PENDANTS, BRACKETS, &c.

ENGINEERING DEPARTMENT.

Every description of GAS APPARATUS, comprising GASHOLDERS, STATION-METERS, GOVERNORS, CONDENSERS, PURIFIERS, RETORTS, SLIDE-VALVES, and every article appertaining to Gas-Works.

Gas Companies advised on Improvements, Extensions, and Alteration of Works.

*** The very best material and workmanship guaranteed, and at prices bearing a favourable comparison with any House in the Kingdom.

This day (July 10th) is published,

BAILEY'S ILLUSTRATED INVENTIONS, with Illuminated Cover and over 300 Engravings. Price 1s.

This book is replete with information, and prices of many well-known as well as perfectly new inventions, interesting to all in the mechanical trades, as well as corporations, governments, gas managers, private gentlemen, and shopkeepers.

Post free in the United Kingdom, 1s.

JOHN BAILEY and Co., Albion Works, Salford, LANCASHIRE.

"FIVE MINUTES' TALK ABOUT GAS"

Is intended to be given by Gas Companies to their Customers. It is hoped the advice it contains may be the means of correcting mistakes and preventing accidents; and also of assisting the Officers in some of the most difficult of their duties.

Price—1000 copies, £1 17s. 6d.: 500 copies, £1 1s. 6d.; any smaller number, at 5s. per 100.

When 1000 copies are ordered, the official title and address of the Company will be printed on the first page without charge. Any greater number by special agreement as to price.

Apply to J. O. N. RUTTER, Black Rock, BRIGHTON.

EDGE'S Patent for Removing the CARBONACEOUS INCRUSTATION from GAS-RETORTS.

For particulars and terms, apply to E. GODDARD, Sole Agent, Gas-Works, IPSWICH.

PATENTED MARCH 11, 1869.

IMPROVED TIN-PLATE CASED DRY GAS-METERS,

WITH SPECIAL FACILITIES FOR ADJUSTING AND REPAIRS,

The principal parts of the mechanism being accessible by the removal of a single screw.

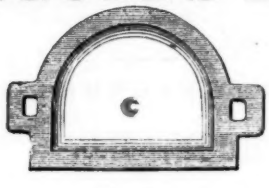
FULLERTON, SON, & CO., EDINBURGH,

SOLE MANUFACTURERS.

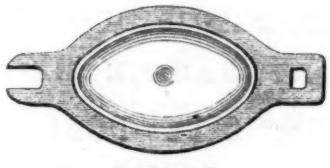
Consumers Wet and Dry Gas-Meters in Cast-Iron Cases, Station-Meters, Gas Apparatus, &c.

DRAWINGS ON APPLICATION.

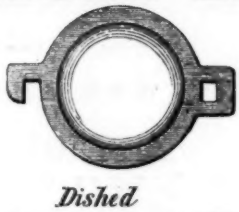
PIGGOTT'S IMPROVED RETORT-LIDS.



Convex



Rabbeted



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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

J. W. Y.—*Ordinary coal gas loses most of its illuminating power under heavy pressure, from the condensation of the hydrocarbons, on which its luminiferous properties principally depend. It is said that in the gas from Boghead and other rich cannels a similar condensation does not take place under pressure, and that such gas may be compressed to the extent of three or four atmospheres without any serious loss in illuminating power.*

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 28, 1869.

Notes upon Passing Events.

THE contest that has already commenced in the City of London, between the present Lord Mayor and Alderman Besley, has, at first sight, only local interest. But there is more in it. Mr. Lawrence is a common-place but respectable member of Parliament, with rather above the average education of an alderman, and more than average abilities as chairman presiding over such a difficult body to manage as the Common Council. An advanced Liberal on the hustings, he is prepared to support in the most Conservative manner all that exists in the City of London. There he is a Tory of the oldest Corporation school, and that constitutes his merit in the eyes of a considerable number of his supporters. They want a Lord Mayor who can speak for the privileges of the Corporation in that Parliament which has shown so little respect for precedent and privilege. Mr. Lawrence's personal friends, also, no doubt wish to put him in the way of receiving one of those baronetcies which the Premier seems distributing with a liberal hand amongst the more eligible of his Liberal supporters. Mr. Alderman Besley is unknown out of the City. Nothing has ever been said against his morals, his manners, or his means; and that, if a Lord Mayor is a mere dinner-giving dummy, is sufficient. No active merits are required. Perhaps, if Mr. Alderman Besley is tried, he may not only turn out an able president, but, on the strength of his office, grow into a member of Parliament not less zealous for the City's rights than Mr. Lawrence. But without expressing any opinion in favour of the present Lord Mayor's claims to re-election, we cannot help saying that the reasons urged in favour of Mr. Alderman Besley trench on very dangerous ground—at least as far as we can gather them from Mr. De Jersey's long and not very lucid letter. Mr. De Jersey seems to maintain that it is enough that Mr. Besley is an alderman; that every alderman, in his turn, is entitled to be Lord Mayor as a matter of course; and that, to re-elect a Lord Mayor who has been competent, and more than competent, is a breach of the privileges of the aldermen who have not passed the chair. If this be so, it is no honour to be Lord Mayor of London. In other great cities, the Mayor or Lord Provost is chosen from the whole body, of the council, for some personal merit, and, if found useful, re-elected again, and even again. Mr. William Chambers has, we believe, resigned, after holding the Lord Provostship for nearly six years, and in that time has rebuilt some of the worst parts of Edinburgh. But, according to Mr. De Jersey, any one who by a fluke has become an alderman, if he can only keep straight with his creditors, must become the machine for dispensing the hospitalities of the Mansion House. If that is the case, we have not the least doubt that at Geneva they would undertake to manufacture a lord mayor, which, on being daily wound up, would go through the whole process of Mansion House duties as cleverly as Vauconson's mechanical duck, which ate and flew. The Geneva lord mayor would even deliver the routine speeches in a melodious voice, and follow them up with appropriate tunes and songs. Of course, as far as the Common Council and the dining clan are concerned, an annual succession of lord mayors is of the greatest value. The Lord Mayor of one year old has paid a large part of his debts of hospitality. There are numerous tribes of feeders, male and female, to whom, having issued one ticket for soup, he feels no call to incur the cost of a second supply. A new Lord Mayor, on the contrary, takes up the invitation-book at the first page, and works steadily over the old Common Council ground. It is, therefore, evidently the interest of the class to whom lord mayors are most valuable to have them bran new every year—hot and hot! But when the day comes that the internal working of the Corporation of London is anatomized by such merciless commissioners as are now sitting at Beverley and Bridgewater, it will be rather awkward to admit that anybody not insolvent is fit for a post that costs to keep up more than a Prime Minister or a Lord Chancellor. A few years ago a Lord Mayor, when in consultation over the dinner list, positively refused to invite the chairmen of certain committees, saying: "They have no

"claim—they are merely chairmen by seniority, and without "any merit of their own." It is unnecessary to add that this Lord Mayor was very unpopular. We do not know that Mr. Lawrence has any special merit which entitles him to re-election, but we are quite sure that if the Corporation wishes to live happy in these troublous times, it should manage that its most prominent representatives should have some more active merit than seniority. At no distant date, the Lord Mayor of London will be elected out of the whole body of the Common Council by the Common Council, and aldermen will be re-elected, if eligible, periodically.

The annually increasing pressure of traffic in the great thoroughfares of London cannot be shunted on one side, after a brief discussion, like a theoretical question. Another four weeks will see the grand improvements of new Blackfriars Bridge and Holborn Viaduct, with its supplementary feeders, thrown open to public use, with or without the glorifying presence of a royal personage. But these new improved thoroughfares will add to the stream of traffic, increasing the demand for wider thoroughfares, and more of them. The viaduct will land passengers by wheels in the gut of Newgate Street and the straits of Cheapside. The easy access over Blackfriars Bridge will make the difficulties of the Ludgate Hill ascent more difficult by comparison. Besides, the Corporation of London and the Metropolitan Board of Works, now fully launched on the sea of street improvement, cannot afford to stand still. The new Mansion House Street presents a very tempting outlet for all the lighter class of vehicles bound to or from the south side of the Thames by way of Southwark Bridge. Heavy carts and waggons will not cross that bridge if they can help it, because the gradients, especially on the London side, demand too much from horseflesh. A valuable suggestion for still further utilizing Mansion House Street, Cannon Street, Queen Street, and Southwark Bridge, has been made by a correspondent in the *Daily News*. It is to make a short street from opposite St. George's Church in the Borough, to the Triangle in Union Street. This street would be only about 500 yards in length, "would commence "at the eastern end of Mint Street, pass through Redcross "Street and Whitecross Street, and at its north-western ex-"tremity emerge upon the open space known as the Triangle," and would be a "continuation of Great Dover Street." It is justly observed, that it would add considerably to the value of new Southwark Street. At present, the Elephant and Castle can only be reached from Southwark Bridge by a very circuitous route. An enthusiast, who is very much shocked at the idea of accommodating the public and disfiguring London Bridge by an iron balustrade on either side, proposes that the bridge "should be widened without altering its present ap-"pearance," by arches on the present piers and spurs which have already good foundations, adding new piers and spurs for architectural effect, we presume, "which would require "slight foundations having only their own weight to carry." This suggestion may be worth considering in the light of the fact that, somehow or other by a new bridge, or by altering the existing bridge, room must be found for the traffic. One plan would be to throw across a suspension bridge, for foot passengers only, with termini a little beyond those of London Bridge.

The numerous accidents in the City at street-crossings have revived the idea of street bridges. This was demolished some years ago in an exhaustive report by the City surveyor, who showed the expense of sacrificing two houses in most expensive frontages, and the impossibility of inducing the feeble, who most want assistance, to climb up and down two sets of necessarily lofty stairs. It is, however, worth considering whether in crowded situations, like that opposite the Mansion House, a tunnel might not successfully solve the difficulty. Railway stations have accustomed the public to the use of tunnels. The descent would be much less than from a street bridge, because the tunnel need be but a little more than 6 feet in height—say 7 feet—and a long inclined plane might take the place of several stairs. It would have to be well lighted and policed, and closed after business hours. The question of expense remains. Does the demand for safety deserve the cost? This can only be answered by figures.

The Metropolitan District Railway has made the following important proposition to the Board of Works:—To extend the railway from Westminster Bridge from the first proposed station near Queen Street to the end of Mansion House Street; to make the (Bank) station under the street, by widening it on either side, and making an opening in it, so widened as not to diminish the accommodation provided by the present proposed width; the railway company to pay at once cash for the property taken for the purpose, and further undertaking to complete the work within three months from receiving permission to enter on the land, so as to cause no serious delay in opening Mansion House Street. The proposition, after a sharp discussion, was, by an amendment carried by a large majority, referred to a committee. An investigation before accepting this plan was indispensable; but the advantage of delivering passengers at the site named are so obvious, provided it does not embarrass existing traffic, that it is difficult to understand on what principles the heated opposition by Mr. Lowman Taylor and his follower was based. Mr. Lowman Taylor is so clever a man, has so statesmanlike a view of public questions, where his personal prejudices do not interpose, that we can only take it for granted that he opposed, as the representative of the Corporation of London, this scheme, as he would any other, affecting the City, which had not first received the sanction of the Corporation. He probably considers it his duty to keep the Metropolitan Board in check, not to assist it in invading the City. The other members who supported his resolution for peremptorily rejecting the "*audacious* proposal" of the District Company, seemed to labour under the mistaken idea that they have a personal quarrel with the railway company, and are bound to throw every impediment in the way of its operations. It is true that the Metropolitan Board is an unpaid body of municipal governors—patriots if you like—and that the directors and engineers of the railway are working only to make money for themselves and their shareholders. But both bodies have the same object in view—to facilitate the traffic between the West-end and the City. The embankment and the new street are glorious things which, when complete, will give no end of *kudos* to the Metropolitan Board; but they will be very imperfect without the railway. With the railway the glory will be increased. The railway directors, being known as speculators, will be left to their fees and their profits. The credit will go to the Metropolitan Board. It is therefore the interest of the Board to make the work as complete as possible. It is true that the directors of the District Railway have not punctually performed their agreements with the Metropolitan Board, and the result has been very natural irritation on the part of the latter. But it should now be remembered that this breach of contract was quite involuntary—that the directors, shareholders, and engineers have all paid severely in pocket or anxiety for their want of credit. The delay has cost tens of thousands. They are in the position of a ground-tenant who has undertaken to improve an estate—to make sewers, streets, and build houses to connect two finished properties—but who could not raise the needful funds. The result would be pressure and ill blood. But when the tenant begins in earnest to get over the money difficulty, and can fix a day for opening the main street, bygones should be bygones, and a proposition for a further and substantial improvement should not be peremptorily rejected. The Metropolitan Board of Works should not snub, but utilize the capital of the District Railway and the talent of its engineers. If a station can be opened at the termination of Mansion House Street, a tunnel should be made in connexion with it and King William Street, across the open space to the Bank, which is now such a danger to pedestrians. This the railway company would, no doubt, undertake, at their own cost, as a feeder to their line.

The Artisans and Labourers Dwelling Act is not to remain a dead letter, as some vestrymen hoped or feared. Already, in Hackney, notice has been given of intention to put its provisions in force. In St. Luke's, as might have been expected, the usual difficulties were raised by the sort of people who object to everything, however needful, that involves trouble and expense. The medical officer of health having reported that certain huts in Wood's Place, Chequers Alley, were unfit for human habitation, the vestry-clerk pointed out that under the Act it was the duty of the vestry to close them and keep them closed until they were put in a proper state of repair. Thereupon several vestrymen—steady defenders of vested abuses of every kind—objected to carrying out the provisions of the Act, on the ground that it would cost money for superintendence, materials, and labour. The clerk, however, explained to them that, if they neglected to do the duties imposed by the Act, the Home Secretary had the power to do it, and charge the parish with the cost. Finally, the favourite policy of paro-

chial parliaments—procrastination—was adopted, and the consideration of what was to be done with the huts "unfit for "human habitation," was adjourned for a month.

The European Life Assurance Society has fallen, like the Albert, because a very large number of rotten companies amalgamated could not manufacture one sound one. Even the ordinary economy of amalgamation seems wanting in assurance companies, the compensation to the officials superseded keeping up the virtual cost of the staff; so that a dozen offices smelted into one are still paid practically for in a dozen secretaries or managers, in meal or malt.

In these fatal bankruptcies it is chiefly the middle classes who will suffer, but the effect will be reflected on the numerous misnamed provident institutions by which working men are victimized. The report of the Registrar of Friendly Societies in England shows how enormous a per centage goes to what may be called the trade expenses of friendly societies—namely, the cost of canvassing, advertising, collecting, and merry-making. The Registrar suggests that a friendly society should be established for medical attendance, a weekly allowance in sickness until sixty or sixty-five, and a pension commencing at the period when sick pay ceases; together with a sum payable at death for funeral or other expenses, and a small fixed monthly payment to defray the indispensable expenses of management. He suggests that the annuity and sum payable at death should be secured by a contract with the Post-Office, and not with the society, and that postmen should be allowed a moderate fee for collecting the payment for Government insurance. Without some such machinery, passive Government security cannot compete with active touting agents. This is a very different thing from allowing miscellaneous fees for indefinite services.

The Irish Land Question being the next important subject for the discussion of Parliament, any facts that bear upon the case are valuable. The case of Prussia, where, after the revolutionary war, the serfs were made freeholders, has often been quoted for the imitation of our Legislature. Whether the mistakes and misdeeds of Irish landlords are to be punished by a partial confiscation of their landed property, remains a problem for the future. In the meantime we are indebted to Lord Lilford for a reliable account of what Prussia really did, in the following letter to the editor of the *Freeman's Journal*:—

In Prussia, before the change in the land laws carried out by the Ministers Stein and Hardenberg, the "peasants land," was the actual property of the peasant, just as fully as the "knights land" was the property of the nobles. But while, on the one hand, the peasant was bound to render to the noble all sorts of feudal dues and services without pay, the noble was bound to support the peasant in old age or sickness, and to employ him or let him be idle, however bad a workman he might be, and serfs are never good labourers. You may easily judge how injurious to both parties was this system of forced labour, which practically excluded from competition the free labourer, and greatly reduced the value of the land, both of noble and peasant. Now, what Stein and Hardenberg did by means of laws gradually enacted from 1807 to 1821, and supplemented in 1850, was simply to make a fair division of property between the nobles and the peasants, according to their respective legal rights. So far from the nobles surrendering any portion of their lands, it was the peasants who gave up—the hereditary class one-third of their land, the non-hereditary (for the tenure was not always the same) one-half of their land; and thereby became free from the feudal obligations to cultivate, without pay, the land of the nobles. The nobles, on the other hand, were freed from the responsibility of maintaining the peasant, and were enabled to employ free labour. It was also arranged that the peasant might purchase the portion of land he was thus bound to give up to his master in exchange for freedom, or might compensate him in other ways by agreement, this operation being assisted by the establishment of land or rent banks by the Government. You will see at once that there was nothing in the original Prussian land laws analogous to the land laws here, where English law has long superseded the old Irish law, under which the cultivator of the soil, though he paid no rent as such, yet really possessed no property at all. For a change in those cruel Irish laws and customs, the Irish people prayed in vain so early as the reign of Edward III., but, as was stated by Sir John Davis, Attorney-General to Elizabeth and James I., "The English lords, finding that the exactions were more profitable than the English rents and services, and loving the Irish, did reject and cast off the English law and government; and in the reign of Edward III. the English lords and the Irish lords did prevent the Irish people from being put under the English law." The laws now complained of are those then prayed for, and if they are to be changed, at least the land law of Stein and Hardenberg affords no precedent. But the point of the matter is this: the custom of the English landlord and tenant is widely different from that in Ireland. In England, as we know, the landlord undertakes all buildings, and usually half the expense of draining and fencing. In Ireland all falls upon the tenant by custom. This being so, the presumption of English law, that all improvements on a farm are the property of the landland, while fair enough in England is highly unjust in Ireland. It is to remedy this, and to secure the tenant in any outlay to which the landlord has not positively objected, that a change in the law is needed; and if men would only act according to their professions, and only ask for what is just to both landlord and tenant, according to the laws of all civilized countries, the settlement would not be difficult.

Lord Lilford, who knows his own country, may have framed in his own mind a plan for giving that compensation for solid improvements, which is the urgent need of the Irish peasant. He may see some way of settling the inevitable disputes of an eminently litigious race by a local tribunal; but when we find a journal of the influence of the *Freeman* advocating fixity of tenure, we are lost in wonder. Where is it to begin, and where is it to end? At what distance from towns is a tenant to be entitled to fixity of tenure? How long must a man have been on the land to become entitled to this bonus—a month, a year, or seven years? What rules are to regulate the sublettings of the tenants who, by Act of Parliament, are to become owners at a ground-rent? The difficulty is only less than that of creating peasant proprietors, who will not become landlords by underletting, or yield to the temptation of ready money in the hands of a great landowner. Those who are most convinced of the moral value of peasantry with a stake in the land—of small farmers breeding the best class of farm servants—are puzzled by the difficulty of retaining land in the hands of peasant proprietors in a country like this, where there are so many temptations to enter into trade. In those continental countries where the independent peasant proprietor is seen to the greatest advantage, there are no such temptations. Agriculture is the only bread-earning pursuit open to the peasant, except service as a paid labourer. Enthusiasm in favour of two such excellent conditions of rural life as the possession of land, either as freeholder or tenant, and good education, leads some advocates into wonderful absurdities. A popular journalist not long since expatiated on the politeness, the good manners, produced by education, and by the independence of a peasant proprietor. Nothing can be more contrary to fact. A genial, expansive manner is a matter of temperament. Barrow pointed out long ago how, as he crossed from Portugal to Spain, a beggar begged in sonorous Castilian with all the dignity of a gentleman. In Southern Italy the people, who are, morally, as ignorant as hogs, and commit murder on the slightest provocation, have charming manners, a taste for music, and a feeling for the picturesque in costume. The Scotch Lowland peasant is usually a man of education, but always silent, reserved, hard, and undemonstrative. The French peasant of the South is a pleasant companion, but there is no greater brute than the peasant proprietor of the North, unless he has been civilized by long service in the army. We have known a long succession of peasants in the north of France pass a man lying in the road with a broken leg, because he was dressed in broadcloth—"a detested "*bourgeois*." The Prussians are much better educated than the Austrians, but the Austrians are more polite. Alexandre Dumas said that he could tell when he had passed the frontier from South Germany into Prussia, by the offensive way in which the Prussian officials slammed the doors. Education refines by affording other than mere animal amusemen s, but education or the dignity of landed ownership will no more give a northerner the charming manners of a southerner, than artificial manure will give a turnip the flavour of a peach. Our people seem cold and brutal when uneducated, but they are capable of higher culture as gentlemen than the elegant and idle creatures of the south of Europe. The proof is that the ranks of our gentry are regularly recruited from the ranks of labour. There is a tendency in a certain school to overvalue the effects of mere literary training.

Some gentleman not quite correct in his facts has been complaining that the Society of Arts does not keep its library in as good order as should be expected from an institution of so much pretension. Our personal experience does not corroborate this complaint, but suggests that it is in libraries that learned subscription societies generally fail. They are often encumbered with rubbish presented by ostentatious members and authors, and deficient in those expensive books of reference which should be the kernel of every public library. Free libraries are so expensive, although most valuable, that they can only be expected in great towns. We hope soon to see the Guildhall Library placed on a footing that will render it a model for all the great parishes of the metropolis—divided into two parts. The reference library of ponderous and expensive volumes, not to be used beyond the bounds of the new reading-room—a reading-room which ought to rival, on a small scale, that of the British Museum, in light, air, and comfort for students; a lending library, open to all the porters, shopmen, and clerks of the City. The education of village schools will always be unsatisfactory until we take a leaf from the Germans, and make the school buildings useful for a library of reference, and a reading-room open to all, without

any other regulation than those necessary for ensuring silence and decency of conduct. Newspapers and periodicals are cheap; books are not expensive, or maps to adorn the walls. Such arrangements would compete with beershops. In the village reading-room we would allow smoking, and if a club could be joined to it, where a joint-stock cup of tea or a pint of pure mild beer was to be had, so much the better. One of the advanced farmers in England—the son and the grandson of a farmer—cultivating fifteen hundred acres, allows no beer at his harvests, but, instead, provides gratis a vast teapot, and a bundle of newspapers to be read aloud by a selected boy. This farmer is the reverse of a teetotaller, but he finds tea pays better than beer in a long day's work.

A certain class of politicians and their newspaper organs are trying to make capital out of the closing of Woolwich and other dockyards. Nothing can be more dishonest. According to the claptrap theory, it is the duty of Government to levy taxes to pay wages and keep up a manufactory, not because it is needed, but for the benefit of the workmen. This is protection in its worst form. The Government is bound to lay out the taxes levied in such a manner as to get the fullest value for the money, otherwise taxpayers are taxed for the benefit of a class, and not for the benefit of the country. On the same principle, the Government should use manual labour instead of machinery—raise weights with a rope and pulley instead of a crane. To put pressure on the Admiralty to make it keep up a useless dockyard, is to imitate the Manchester stonemasons, who demand that stone shall be brought to work in the rough, not hewn out in the quarry.

The advocates for the restoration of protection should read the history of the duties on wool and woollen goods. When the dispute between the flockmasters and woollen manufacturers came before Huskisson it assumed the following shape:—The flockmaster claimed to export the English long bright lustre wool (which no other country produced in the same perfection), and to have merino wools of Spain and Germany excluded by high duties. The woollen manufacturers asked that the exportation of English long wool should continue to be prohibited, at the same time asking that merino wools should be admitted at a low duty, and foreign woollen goods altogether excluded. The Gordian knot was cut by the puzzled minister, who established free trade in woollen and wool imports and exports under revenue duties. Nothing is easier than to favour a certain trade, but where are you to stop? If the prices of the coat, the shirt, the silk and merino gown, the stockings, the shoes, are to be taxed by protective duties, the farmer will protest against the free admission of the food he grows. The question will have to be reargued if trades union principles are to influence legislation, because trades unionism means the artificial enhancement of wages, and therefore the artificial enhancement of prices.

Circular to Gas Companies.

The Sheffield Town Council, after an unusually able discussion, have resolved, by an overwhelming majority, to follow the Town Council of Leeds in an attempt to seek for powers to purchase the gas-works. The tone of the debate was amicable throughout, and indicated a sincere desire on the part of the council to do justice to the shareholders of the company. It remains to be seen whether these will voluntarily consent to part with their property. The plan of purchase which seems most in favour in the council is by granting annuities secured on the rates as well as on the gas-works; and although at present no mention is made of the amount, it seems likely that 10 per cent. would be offered by the council. Probably this plan would also be most in favour with the shareholders. The speech of Alderman Saunders, who moved the adoption of the report published in our last, and the appointment of a committee to take the necessary steps for effecting the transfer of the works from the company to the Corporation, expressed a strong determination on the part of the council to succeed in their endeavour at almost any cost; but at the same time intimated a hope that the matter might be settled by an amicable negotiation.

The idea of the promoters of the movement is to apply the profits of gas-making to town improvements and the reduction of taxation, and it seems to be assumed that Parliament will place no restrictions on the application of the money. On this point the consumers will have to be heard, who will, no doubt, contend for a reduction in price, and so in the end leave the Corporation, if successful, with but little for improvements for some years to come. The accusation of wasteful management brought against the company fell to the ground. An idea seemed prevalent in the council that gas-works once set going would manage themselves—a notion of which they may be disabused when they get the works into their own hands. So strongly, however, is the council convinced of the benefits to be derived from undertaking the work, that the resolution appointing a committee to prepare a Bill for next session was carried by a majority of 24, the whole number present being 32.

It must be remarked that there is a great difference in the present position of the Leeds and Sheffield Companies as compared with the Glasgow Companies, the former having no Bills before Parliament through which pressure can be put on them by threatening to pass a competing Bill, should the companies not agree to reasonable terms for the purchase of their works. The suggestion of a competing scheme was made at Sheffield, but it found little favour in the council, who had no hope of getting such a Bill passed.

Beyond what we have said above, nothing has transpired as to the terms the Corporations of Leeds and Sheffield are prepared to offer. A perpetual annuity of 10 per cent., or £200 for £100 stock, seems to be the terms speculated on at Sheffield. Whether the shareholders will be disposed to part with their property on these terms remains to be seen; but it is quite certain that, to ensure the success of the operation, the compensation offered must be satisfactory to the companies. In view of passing events, it may be doubtful whether it is worth while to fritter away money in fruitless opposition. Some months since, upon the occasion of the passage of the Glasgow Corporation Gas (Purchase) Bill, we remarked that the system of municipal gas supply was apparently rising in public estimation, and that it was merely a question of time and money as to when the principal gas-works of the kingdom would pass into the hands of public bodies. What is now passing in Leeds and Sheffield on the supply of gas confirms this remark; and, as the time for giving parliamentary notices approaches, other towns will probably be found prepared to adopt the same system.

The proprietors of the Redditch and Bromsgrove Gas-Works have agreed to sell their respective properties to local companies, the former at a fixed sum of £10,000, and the latter at a valuation to be made by Mr. Barlow on behalf of the sellers, and Mr. Walter May on behalf of the purchasers, or by an umpire appointed by them in case they are unable to agree. This is a sensible course of proceeding, infinitely preferable to the establishment of competing works, which was the object of the agitation, that has resulted in each case in an agreement between the proprietors and the public.

However absurd current notions as to the danger of gas-works may be, it can never be contended that they are ornamental; nor can it be said that the exhalations from them are agreeable to the senses if not detrimental to health. Under these circumstances it is not surprising that the inhabitants of a rising town like Southport should object to the extension of works in a situation where it is admitted they are a disfigurement, and at the same time a nuisance. We observe with some astonishment that a majority in the Town Council of Southport are indisposed to avail themselves of an opportunity of removing their works away from the town at a very moderate sacrifice. The report of Messrs. Veevers and Waugh makes it perfectly clear that new works could be erected on a site without the town at an expense of about £6000 more than it would require to make the necessary extensions of the present works within the town. Seeing the smallness of the present sacrifice, which would most probably result in future profits, it is surely short-sighted policy on the part of the council to perpetuate and extend an admitted nuisance.

The report of the meeting of the shareholders of the Imperial Austrian Gas Company (in liquidation) is very interesting to those who are disposed to share in foreign ventures. The large sums paid for concessions are altogether lost, and the Baden works, which cost £18,000, have been sold for £12,250. Those curious in the history of the management of the company may refer to the balance-sheet given at page 319, vol. xvi., of the Journal of Gas Lighting, on which a return of £2 5s. on each fully paid-up £25 share is proposed, and the propect of a small further dividend is announced. As it has

turned out, all that the shareholders are ever likely to get is a return of perhaps £2 10s. on each of the 2242 paid-up shares.

The Board of Trade has reappointed for one year Messrs. Patterson, Evans, and Pierce as gas referees under the City of London Gas Act, 1868, and made them referees under the Imperial and South Metropolitan Acts of last session. Dr. Letheby is also made chief examiner, and Mr. Parkes auditor, under the two last-named Acts.

A joint committee of the Lords and Commons, appointed in March last to consider whether any facilities can be given for the despatch of business in Parliament, especially in regard to the relations of the two Houses, has made its report, and agreed to the following resolutions:—

1. That it is expedient that opposed private Bills should be referred to a joint committee composed of members of both Houses.
2. That the House of Commons should not insist on its privileges in regard to local rates in the case of private Bills, or in the case of public Bills confirming provisional orders.
3. That the Chairman of Committees of the House of Lords, and the Chairman of Ways and Means in the House of Commons, should confer at the commencement of every session, as at present, and determine in which House the respective Bills should be first considered.
4. That all petitions against a private Bill should be deposited in both Houses within fourteen days after the first reading of the Bill in the House in which it commences.
5. That a joint Standing Orders Committee of Lords and Commons should be appointed at the commencement of every session, with power on each occasion of meeting to appoint a chairman.
6. That each House should appoint a Committee of Selection, consisting of five members. That each Committee of Selection should have power to confer with the corresponding committee of the other House, and should appoint members from its own House to sit jointly with any committee of the other House on opposed private Bills.
7. That the joint committees on opposed private Bills should consist of three members of each House.
8. That one of the members of the committee of the House to which the Bill belongs, to be named by the Committee of Selection of such House, should be chairman of the joint committee.
9. That all members of such committees, including the chairman, should vote, and, if the votes are equally divided, that the question should be negatived.
10. That the committee should report the Bill to that House by which it was referred; and that a copy of such report should be deposited in the Private Bill Office of the other House.
11. That the Bill, on being reported, should pass through its customary stages, as heretofore, in that House in which it originated; and should be open to amendments, and to recommitment. That, in case of recommitment, the Bill should be referred to the former or to some other joint committee, as may be expedient.
12. That when a private Bill has been passed through its several stages and sent to the other House, it should be treated in the latter House as an unopposed Bill; unless, in any special case, the House should order it to be recommitted. That the Bill, in such case, should be referred to the former or to some other joint committee, as may be expedient.
13. That unopposed Bills continue to be treated according to the existing Standing Orders of both Houses.
14. That a joint committee of referees on *locus standi* should be appointed, with power to frame general rules in regard to the right of petitioners to be heard against private Bills, such rules to be laid upon the tables of both Houses.
15. That the joint committee of referees should consist of the chairman of the Lords committees, one other member of the House of Lords to be appointed by that House, the Chairman of Ways and Means, one other member of the House of Commons to be appointed by the Speaker, and the counsel to the Chairman of Committees and the Speaker's counsel as official referees; three to be a quorum, with power on each occasion of meeting to appoint a chairman.
16. That all questions relating to the *locus standi* of petitioners against Bills belonging to either House should be heard and determined by such committee of referees, without prejudice, however, to the power of the joint committee to which any Bill is referred to decide upon any such question arising incidentally in the course of their proceedings.
17. That all members of the committee of referees, including the chairman, should vote, and if the votes are equally divided, that the question should be negatived.

Mr. Dodson, the Chairman of Ways and Means, who has some peculiar crotchets of his own on gas and water legislation, proposed—"That where a gas or water company, incorporated "under the Joint-Stock Companies Act, seek compulsory "powers to break up roads or streets, the Board of Trade "should be authorized, with the consent of the local authority "of the district or districts affected, and in the absence of "opposition from any similar company serving the same "district or districts, to issue, if it see fit, a certificate, as "provided in regard to railways by the Railways Construction "Facilities Act, 1864, giving to the company the powers re-"quired." The resolution, however, does not appear to have received the support of any of Mr. Dodson's colleagues, and has, therefore, for the present, fallen to the ground.

The idea that gas of high illuminating power is to be obtained from sewage has taken a strong hold of the popular imagination. The subject was referred to at the meeting of the Sheffield Town Council; and at the meeting of the Board of Works, on Friday last, Sir John Thwaites announced that the Board of Works would afford every facility to any one who wished for a supply of sewage to test the principle. All the noise made is founded upon a very vague report of experiments which have been made in India. If, as Sir John Thwaites avers, Indian sewage is solid excreta, everybody knows what sort of gas will be obtained by distilling it in a retort. If it approaches anything like the character of what is known as sewage here, a very wonderful discovery indeed has been made, if any means of making it yield an illuminating gas have been found. With the information we have at present, it may be unphilosophical to deride the notion; still it appears to us that the man engaged in the manufacture of gas from sewage is about as hopefully employed as the philosopher Captain Lemuel Gulliver saw busily occupied with the endeavour to extract sunbeams from cucumbers.

A very interesting paper on the effect of atmospheric air when mixed with gas in reducing its illuminating power, by Professors Silliman and Wurtz, will be found in another part of our columns. Their results differ somewhat from those obtained by MM. Audouin and Bérard, showing a rather smaller loss of illuminating power in proportion to the addition of air. According to the French experimenters, the loss of illuminating power is 6 per cent. for every 1 per cent. of air; while the authors of the paper we name found that up to 5 per cent. of air the loss of candle power is a little over 6-10ths of a candle for every additional 1 per cent. of air. Above 5 per cent. and up to 12 per cent. the loss falls to half a candle for each 1 per cent. of air, and above this the ratio of loss falls still lower. A remarkable paper by Mr. Carl Schultz is quoted, which, though published some years ago, seems to have escaped observation. In a similar series of experiments, Mr. Schultz made the observation that the addition of air to rich cannel gas of not less than 30-candle power, up to 12 per cent., rather increases than reduces the illuminating power.

Legal Intelligence.

SOUTHWARK POLICE COURT.—Saturday, Sept. 18.

(*Before Mr.* Partridge.)

Mr. *W. P. Boddy*, the secretary of the Surrey Consumers Gas Company, Rotherhithe, was summoned by Mr. John Green, the proprietor of the Prince of Wales ale and stout house, Snow's Fields, to show cause why they neglected to supply him with gas after tendering a sufficient deposit.

Mr. Hicklin, who supported the summons, said that his client in June last purchased the ale and stout house in question, and laid out considerable sums in improvement. He applied to the defendants to be supplied with gas for five burners only. The previous tenant had used nine burners, and the average sum for gas consumed annually was £4. Much to his client's surprise the company refused to supply him with the required gas unless he paid down £4 as a deposit. Mr. Green, considering it a gross exaction on their part, declined to pay them nine months in advance, but offered them £1 as deposit, being equal to the quarter's consumption by the former tenant. He (Mr. Hicklin) contended that the Metropolis Gas Act, 1860, never contemplated that the gas company should exact two or three quarters in advance from their consumers, for if such was allowed they would be trading on the capital of the consumers. The complainant therefore came to his worship to decide the amount of deposit justly payable to the company under the 15th and 16th sections of the Act of Parliament.

The *complainant* said when he took the house there were nine lights. In the alterations he discontinued four; consequently the gas bills would be considerably reduced. He produced the bills paid by the former tenant, showing the average annual amount paid to be £4, and he tendered £1 deposit, which he considered fair. The company, however, demanded £4, and refused to supply him unless he deposited that sum. The consequence was, he was compelled to carry on his business from June last without gas, to his serious detriment. When he offered the company £1 deposit the secretary refused to receive it, saying he would not accept £3 19s.

For the company it was contended that the demand of £4 security was not at all exorbitant when the trouble the company had to get the money from former tenants, several of whom had left without paying, was taken into account. The company considered that they were acting justly in protecting themselves from further loss.

Mr. Partridge said he had recently carefully perused an excellent work on gas legislation, by Mr. S. Hughes, F.G.S., and he agreed with Mr. Hicklin that the Act of Parliament gave gas companies great power over the public. After hearing the evidence of Mr. Green, he was satisfied that £4 demanded by the company as security was an exorbitant sum. He therefore decided that £1 was sufficient, and advised the company to allow the complainant 5 per cent. interest thereon.

Judgment for plaintiff accordingly.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Metropolitan Board of Works—Friday, Sept. 24.

At the Meeting of the Board this day, at the Offices, Spring Gardens—Sir John Thwaites in the chair,

The Clerk presented a letter from the Board of Trade, with reference to the appointment by the board of Mr. Keates, as gas examiner, and calling attention to sections 44 and 46 of the City of London Gas Act, which appear to contemplate that the testing operations at each testing-place should be conducted by a duly appointed gas examiner, pointing out the impossibility of one person undertaking the duty at all the stations, and requesting to be favoured with the board's observations on the subject; also a letter from the Board of Trade, stating that they have, under the City of London Gas Act, 1868, the Imperial Gas, and South Metropolitan Gas Acts, 1869, appointed Mr. Robert Hogarth Patterson, Mr. Frederick John Evans, and Mr. John Sampson Pierce to be gas referees for one year, and appointed Dr. Letheby to be chief gas examiner, and Mr. Charles Henry

Parkes to be auditor of the accounts of the Imperial and South Metropolitan Gas Companies respectively.]

The SOLICITOR laid before the board the Acts of Parliament passed last session in reference to the South Metropolitan and Imperial Gas Companies, with his abstracts of the principal provisions of the same, and recommended that they be referred to a committee to consider what steps should be taken by the board for carrying such provisions into effect.

Mr. DRESSER ROGERS said the question of the gas supply of the metropolis and the operation of these two Acts, taken in connexion with the possibility of further legislation next session, was of so much importance that the board ought not to come to any hasty decision thereon. In the absence of Mr. Newton, who had given a large amount of attention to the subject, and whom he did not wish to supplant, he would recommend the board to defer any discussion thereon till the following week, especially as there was no demand for immediate action. In the meantime he would give notice for the appointment of a committee of fifteen members, to be called the Gas, Water, and Petroleum Committee, to whom all matters relating to these subjects should be referred.

The CHAIRMAN said he had read in the newspapers, with no little surprise, a statement that a mine of wealth was open to the board by the conversion of the sewage of the metropolis into illuminating gas, the foundation of that statement being the success which had attended certain experiments made in India. It appeared to him that the writer of the statement failed to remember for the moment that the condition of the sewage in India being essentially different to that of the sewage of the metropolis—the former being in a solid state, the latter diluted to the extent of 94 or 95 per cent. with water—would make a considerable difference in the application of the principle upon which those experiments proceeded. However, so far as the board were concerned, he was sure the members would be delighted to find that, in addition to applying sewage to land, they could distil it into gas for the lighting of the metropolis, and thus derive a further revenue from its useful application. All he could say was, that he hoped the parties who had made the suggestion would be able to support it by an illustration of a practical character somewhat nearer home, and by experiments upon sewage of a character more like that with which the board had to deal. He was quite sure the board would give every facility for testing the principle, if the parties desired to have a supply of London sewage for the purpose. No doubt gas could be obtained from sewage, or water, or many other things, but it was a question whether it could be so obtained at a cheaper rate than by the distillation of coal. He merely mentioned the matter lest the idea should get abroad that London sewage was at all analogous to sewage in India, and that the board were neglecting their duty in not becoming manufacturers of gas from this article.

IMPERIAL AUSTRIAN GAS COMPANY, LIMITED.

(IN LIQUIDATION.)

A Meeting of the Shareholders of this Company was held at the Office of the Liquidators, No. 10A, King's Arms Yard, in the City of London, on Tuesday, Sept. 14—G. BULKLEY, Esq., in the chair.

The LIQUIDATORS (Messrs. Edwards and Bulkley) presented the following report and statements of account:—

The liquidators were appointed at a meeting of the shareholders held on the 7th of February, 1868, and on the 14th of the same month an order was made to continue the winding up under the supervision of the court.

Having provided for the proper carrying on of the gas-works at Baden and St. Polten, while steps were being taken for their sale, the liquidators proceeded to settle the list of contributories, and placed upon the list the holders of 2002 shares fully paid up, and the holders of 239 shares, on which there were arrears of calls remaining unpaid, amounting to £2350. Of that sum £2000 was due from certain shareholders in Austria; and those shareholders, after an application to them by the liquidators, positively refused to pay. Under these circumstances the liquidators were compelled to take out balance orders, and by the special leave of the court the orders were served in Austria. The effect was the recovery of the £2000, with £263 3s. 3d. for interest. In addition to this sum £51 7s. 10d. was recovered from English shareholders, with interest £92 7s.

The amount now due for arrears of calls is £290, of which the liquidators believe only £40 is likely to be recovered.

By the above payments the number of shares standing fully paid up, and in respect of which the holders are entitled to a return of capital, was increased to 2242.

The liquidators advertised in the usual way for claims; and having regard to the fact that numerous persons abroad claimed to be creditors of the company, it was considered desirable to take the assistance of the court in adjudicating upon the claims, in order that creditors who failed to put in their claims within a reasonable time might be shut out from distribution.

The debentures, which were outstanding, amounted to £1250, which, with interest to the date of the payment of the claims—viz., the 9th of August, 1869—amounted to £1412 13s. 4d. The liquidators, by negotiations, in which they were assisted by the late secretary of the company, succeeded in settling with the debenture-holders for £1299 14s. 6d.

The total ordinary claims sent in to the liquidators amount to £6019 1s. 6d., of which the amount of £4418 17s. 6d. was allowed, claims amounting to £123 stand over for further proof, and the balance amounting to £1377 4s. was disallowed.

Of the claims allowed, £4418 17s. 6d., the liquidators have paid £3800 0s. 1d., leaving £618 17s. 5d. still due, the sums making up which have not yet been applied for.

The claims outstanding consist partly of claims for interest, and will probably be proved against the company to the extent of £35, or thereabouts.

The liquidators, upon their appointment, took all necessary steps to secure the proper carrying on of the works, that they might sell them in working condition. They had necessarily to depend in a great degree upon the gas manager, resident in Austria, and from the condition in which the works were at the time of the commencement of the liquidation, large outlay had to be made month by month in addition to the structure, meters, &c. The result of this expenditure, added to that of the working, is shown in the liquidators works account to have resulted in an apparent loss to the company of £954 4s. 9d.; but it may be fairy considered that more than this sum was recovered in the enhanced price at which the works were sold. While upon this subject, the liquidators think it right to mention that the gas manager, in rendering his final account, showed the company to be in his debt in a sum of 11,768 fl. 77 k., or about £1030 sterling. The liquidators disputed the account, and compromised with him for a sum of £400, which sum is brought into the working account as a payment.

At the time of their appointment the liquidators found that there were several lawsuits pending against the company in the Austrian courts, and an arrest was shortly afterwards laid upon the works by the holders of debentures for £650; the works were liable to further arrests in respect of the lawsuits, and it appeared probable that serious complications would arise on the sale of the works, and great loss to the shareholders. In fact, at that time it was the opinion of some of the largest shareholders and creditors, that there was great doubt of the company ever realizing enough to pay its creditors. The liquidators were from time to time served with formidable-looking documents, decrees, and orders of Austrian courts, as to the real effect of which it was very difficult to form a full appreciation, and the information the liquidators could obtain from Austria as to these decrees, &c., was very meagre; added to this there was great diversity of opinion existing as to the value of the works, and after mature consideration the liquidators determined that one of them should proceed to Austria to see into the position of the company as to the works and the lawsuits, and to employ the firm of Messrs. Ventom, Bull, and Lucas, the surveyors, to report to them the condition and value of the works, and to advise with the liquidators generally as to the sale.

In accordance with this resolution Mr. Edwards went to Austria, and, besides fully informing himself on the spot of the position of the company, was able materially to smooth the way for the ultimate sale of the works.

Messrs. Ventom, Bull, and Co. reported on the value of the works, and fortified with their opinion, and afterwards with their active assistance in the negotiations, the liquidators succeeded in disposing of the works for a sum of £12,250, the purchaser paying also for the stock of coals, meters, &c., and paying all the expenses of transfer. The sale was made as on the 1st of January, 1869, and a deposit was paid on the 22nd of January; but the purchase was not completed until the 23rd of July last, the purchaser paying interest at 5 per cent. up to that date.

The liquidators succeeded, after a protracted suit, in recovering from the municipality of St. Polten the caution-money—viz., 6000 fl. and interest—which was paid in Austrian bonds, which are in the hands of their representative in Vienna for realization.

The result of the liquidation is that, after paying off the debentures, paying the creditors who have proved their claims in full, and providing for those likely to be proved, and providing for the costs of liquidation to the present time, there is a present surplus of £6321 3s. 7d.

The liquidators propose to pay to the shareholders, as a first distribution, £2 5s. per share on the 2242 shares paid up. This sum will absorb £5044 10s., leaving £1276 13s. 7d.; which, with the amount to be realized for the Austrian bonds, it is considered desirable should be retained for the present against any contingency that may yet arise in the liquidation.

The liquidators feel that they have reason to congratulate the shareholders upon the success of the liquidation, which, although they never held the extreme views some of the shareholders did, has resulted in a larger return to the shareholders than they at first anticipated.

STATEMENT SHOWING PRESENT POSITION OF THE COMPANY, *September* 14, 1869.

Dr.				*Cr.*		
To Creditors, for claims adjusted but not paid	£618	17	5	By Cash in hand	£7,435	1	0
Alleged creditors who have not yet proved their claims, £123 of which it is estimated will be proved	35	0	0	Arrears of calls £290, of which it is estimated will be realized	40	0	0
Amount reserved for law costs, probable amount thereof	500	0	0	Austrian bonds and interest, 6296fl. 09k.			
Balance down	6,321	3	7				
	£7,475	1	0		£7,475	1	0
2261 shares issued, less 19 in arrear of call.				Balance down available for distribution	6,321	3	7
2242 shares entitled to distribution.							

GENERAL ACCOUNT OF RECEIPTS AND PAYMENTS, *by the Liquidators, from February* 7, 1868, *to September* 14, 1869.

Dr. RECEIPTS.				*Cr.* PAYMENTS.			
To Balance of banking account at commencement of liquidation	£51	11	0	By Cash paid the provisional liquidator per order of the court	£21	1	6
Arrears of calls	2,051	7	10	Balance of cash account of Baden and St. Polten Gas-Works	954	4	9
Interest on arrears of calls	285	10	3	Cash paid in payment of debentures and interest	1,299	14	6
Net proceeds of works at Baden and St. Polten, including interest on the purchase-money	12,059	1	5	Ditto paid to creditors	3,800	0	1
Net proceeds of St. Polton caution-money and interest, of which 6000fl. is in Austrian bonds, 6296fl. 09k.				Ditto paid costs of the London Gas-Meter Company	47	17	4
				Ditto paid liquidators charges	823	1	4
				Ditto paid rent and incidentals	66	10	0
				Balance in hand	7,435	1	0
				And in Austrian bonds, 6296fl. 09k.			
	£14,447	10	6		£14,447	10	6
Balance down	£7,435	1	0				
And in Austrian bonds, 6296fl. 09k.							

It was then resolved—"That the report and accounts of the liquidators, which have been read to the meeting, be and they are hereby received, approved, and adopted."

A vote of thanks was also passed to the liquidators.

LIMEHOUSE DISTRICT BOARD OF WORKS.

On Wednesday, the 15th inst., a Meeting of this Board was held in the Board Room, White Horse Street, Stepney—Mr. W. NATHAN in the chair.

At a former meeting the surveyor reported that owing to some dispute having arisen between Mr. Jones, the engineer of the Commercial Gas Company, and Mr. Thomas, the engineer of the Regent's Canal Company, the former had discontinued the supply of gas to the public lamps in the thoroughfares surrounding the canal company's premises, including the Horseferry Road, and part of Narrow Street, Limehouse. The surveyor now stated that with reference to the lighting of Horseferry Road, Mr. Jones, the engineer of the gas company, had written to him to say that there was no private pique between him and Mr. Thomas, the engineer to the Regent's Canal Company, leading him to cut the gas off from that thoroughfare; and that he desired him (the surveyor) to contradict the statement he had made to the board on the subject. He (the surveyor) had made arrangements with Mr. Thomas to have the lamps lighted with paraffin.

The SURVEYOR said it would be in the remembrance of the board that at the last meeting he reported that Mr. Jones, the gas company's engineer, had cut off the gas from the Horseferry Road, from a feeling he had towards Mr. Thomas, the Regent's Canal Company's engineer. Mr. Jones's letter was a contradiction of that, and as he (the surveyor) made the statement to the board, he now desired in as public a manner to give currency to Mr. Jones's denial. In sending this denial, however, the matter was placed on a more business footing, and the question was now between the gas company and the Board of Works. The gas company had chosen to cut off the gas from

certain lamps, and he would recommend the board to have the matter cleared up as speedily as possible. In the interest of the ratepayers that should be done, because if the company was right in the instance referred to, at any future time, on a person interfering with their meters, the company might cut off the gas from the whole district. If they had that power, the sooner the law on the subject was altered the better; it would be for the board, in the interest of the residents in the district, to get it altered. Whatever the Regent's Canal Company might choose to do, had nothing to do with the board; they could not entertain that. The question was now between the gas company and the Board of Works. He was of opinion, as was the clerk, that the gas company had no power to withhold the supply of gas. Mr. Thomas had met him very readily in the matter, and had placed lamps in Horseferry Road and Narrow Street. He recommended a formal notice to the gas company to relight the roads in question.

The CHAIRMAN said he quite coincided in the suggestion of the surveyor, as it was absurd in these times to light a thoroughfare by paraffin lights, and as the lamps were only placed where the gas had previously been, the light afforded was not nearly so effective, and consequently accidents were more likely to arise. There was great difficulty in lighting this portion of the road. The gas company allowed a main to be carried across the old bridge, and the canal company having occasion to open the bridge, removed the main, and substituted a gutta-percha tube. This circumstance seemed to have offended the gas company, and hence the supply being cut off.

Mr. MIDDLETON asked if there was any plea for cutting the gas off.

The SURVEYOR said there was a matter between Mr. Thomas and the gas company, but it had nothing whatever to do with the board. The letter from Mr. Jones had made that apparent. As, however, there was no ill feeling, it was a matter of business. If the gas company had violated the Act of Parliament, and his opinion was strongly in favour of that view, then he hoped the board would insist on having the gas to the lamps restored, and subject the company to penalties to the full amount.

Mr. MIDDLETON supported the view taken by the surveyor, and moved that a letter be written to the company, calling on them to restore the gas to the lamps.

Mr. BOYD seconded the motion, which was carried.

SOUTHPORT GAS SUPPLY.

PROPOSED REMOVAL OF THE GAS-WORKS.

At the Ordinary Meeting of the Southport Town Council, held on Tuesday, Sept. 14—the MAYOR (Alderman Boothroyd) in the chair—the following report by Messrs. Veevers and Waugh, the engineers appointed to advise the corporation on this subject, was presented:—

Southport, Sept. 12, 1869.

To the Mayor and Corporation of Southport.

Gentlemen,—On the 12th of August last the following resolution was passed at an adjourned meeting of your council:—

"That Messrs. Waugh and Veevers be instructed to prepare a joint report as to the best and cheapest mode of supplying the borough of Southport and the adjoining districts with gas, on the present or any other site, under the direction and superintendence of a sub-committee, formed of Messrs. Holt, Smith, Ireland, and Fisher."

The sub-committee above named subsequently gave us in effect the following instructions as a basis for our joint report:—

1. That we report on the best of the following sites for the proposed new works—namely, Crowlands, Birkdale, Chicory Farm, and Brown Edge.
2. On the expenditure necessary for making the present works in Eastbank Street equal to the manufacturing and storing 620,000 feet of gas in 24 hours, including cost of land that will have to be acquired, and of alterations and additions to mains in the town.
3. On the practicability of making a siding from railway to present works.
4. On the cost of entirely new works away from the town, including land and plant capable of manufacturing and storing 620,000 feet of gas in 24 hours, mains in the town, railway siding, extra cartage of coke, and carriage from junction of siding, and also saving in carriage of materials by railway and of tar to the distillery on the Moss.
5. On the expenditure necessary on present works until new works are completed.

We beg to report on the above instructions as follows:—

1.—On Site of New Works.

After careful examination of the sites named, we recommend the site at Crowlands, near Blowick siding, as the best for a proposed new works, having regard to its distance from the town, its proximity to the railway, that a portion of the necessary siding is laid, and that a station is ordered by the railway company at Blowick, to be erected forthwith; it has also a suitable subsoil for foundations, and the proprietors of the land are willing to sell at once, and are owners of all land within a radius of 300 yards.

2.—On the Cost of Increasing Present Works.

We have prepared an estimate, which accompanies this report (see Table A), giving the details of expenditure necessary for the manufacturing and storing 620,000 feet per day, or 335,000 feet more than the present make—an increase of about 117 per cent. The total cost of this extension will be £29,107 16s. 3d., from which has to be deducted £1027 13s. 4d. (see Table B) for value of old materials, leaving a net expenditure of £28,080 2s. 11d. This estimate does not, however, include the value of the reversion of present site, which we have not been able to ascertain.

3.—On Siding to Present Works.

It is somewhat doubtful whether a siding into the present works can be obtained, on account of the waggons having to cross the main line so near the station; but a definite reply will be given by the railway company in a few days.

4.—On the Cost of New Works.

In the estimate (Table C) we give details of the cost of new works, if erected at Crowlands, including land and mains to connect the works with gasholder in Eastbank Street, which we presume would be left there as a supply-holder to the town, even in the event of a removal of the manufacturing department; the whole amounting to a total cost of £44,267 12s. 5d. In Table D are given particulars of the deductions necessary to be made from this estimate for the value of houses, land, and materials in present works, amounting to £4794 4s. 5d., and also the capitalized value of the saving effected on carriage, &c., by the works being at Crowlands, which would amount to £273 17s. 10d. per annum, at 22 2-9ths years purchase, would be £6086 9s. 8d.; so that the cost, deducting the first item, would be £39,473 8s., and of the second, £33,386 18s. 4d. If the proposed new works be erected, the present 60-feet telescopic holder in Eastbank Street would be retained, and a plot of land for the stowage of meters, mains, and service-pipes, and for the erection of a meter-house and governor for Birkdale, the total area of which would be 1870 square yards. A plan has been prepared to show this arrangement. Neither this estimate nor the one in Table A includes the cost of obtaining an Act of Parliament. We may remark that longer tanks may be constructed at the Crowlands site than at the present works for the same outlay, in consequence of the subsoil of the former allowing of the erection of brick instead of iron tanks.

5.—On the Expenditure necessary for Present Works.

In reference to this we may observe that if the purchase of the site at Crowlands be effected at once, and the erection of new works be commenced immediately, these works can be in operation by the winter of 1870-71, and under these circumstances no expenditure will be requisite on present works over the ordinary outlay for current wear and tear.

It will be observed that we estimate the net cost of an entirely new works on a suitable site, and with an ample area of ground, to be £39,473 8 0
And the net cost of enlarging present works (not including reversion) to be 28,080 2 11

Being a difference of £11,393 5 1
From which may be deducted the value of savings 6,086 9 8

Making an actual difference in the two plans of £5,306 15 5

We may remark that the above value of savings does not alone represent the pecuniary advantage of the proposed new works over the old ones. The works would be laid out on the most modern plan, with every appliance for economy in manufacture; the distillation of tar and manufacture of sulphate of ammonia would be conducted under the immediate supervision of the manager, and at a less expense for superintendence; the removal of spent lime and other impurities would be effected without creating a nuisance in the streets; the only large manufacturing establishment in Southport would be removed, and the making of gas would be conducted in a manner more satisfactory alike to yourselves, the ratepayers, and your engineer.—

We are, gentlemen, your obedient servants,
HARRISON VEEVERS,
Engineer to the Bolton Gas Company.
JOHN WAUGH,
Engineer to the Corporation Gas-Works, Southport.

TABLE A.

Summary of cost of present works when laid out to manufacture and store 620,000 cubic feet of gas per day, with estimate of the value of property that will have to be acquired at present works, in order to carry out the above; also the cost of alterations and additions of mains for the requisite supply to the consumers.

Asterisks (*) indicate that there are deductions in Table B.

Estimated cost of new retort-house to increase the make to 620,000 cubic feet per day	£2,514 0 0
Cannel-shed	579 0 0
Two new holders and renewal of one	11,600 0 0
Purifying-house and apparatus additional to present	2,500 0 0
*Scrubbers and condensers, with connexions	1,500 0 0
*New meter-house, meter, valves, and connexions	1,430 0 0
Exhauster, boiler, and pump-houses, one boiler with connexions, and smithy	1,010 0 0
New crane, and fixing	105 0 0
Store-rooms, lamplighters-room, photometer-room, &c.	375 0 0
New tank for tar and ammoniacal liquor over boiler-house, and connexions	450 0 0
*New distillery works, at Moss	1,000 0 0
*New mains, including laying, &c.	1,674 5 0
Flagging, paving, and asphalting	50 0 0
Mains in yard	500 0 0
*Property to be taken down (rent, £115), at 20 years purchase	2,300 0 0
Land to be acquired at the works, Eastbank Street, £130; ditto at Moss, £114	244 0 0
Purchase of reversion (cannot be ascertained).	
Five per cent. contingencies on £25,531 5s.	1,276 11 3
	£29,107 16 3

TABLE B.

Deductions from Cost of Extension of Present Site.

Scrubbers and condensers (sale of old)			£65 0 0
Meter-house (value of material)			85 0 0
Property (value of material)			400 0 0
Mains (less mains taken up as follows:—138 yards of 6-inch, 220 yards of 4-inch, 190 yards of 2-inch)			70 13 4
580 yards of 6-inch (Lord Street)			87 0 0
New distillery at Moss (less value of tank from works)	£200 0 0		
Small engine for pumping	20 0 0		
Old materials, bricks, and slates, from gas-works, towards buildings	60 0 0		
Tank to be elevated for filling casks, &c., with tar to be removed from gas-works	40 0 0		
			320 0 0
			£1,027 13 4

TABLE C.

New Works capable of Manufacturing and Storing 620,000 Cubic Feet in 24 Hours.

Asterisks (*) indicate that there are deductions in Table D.

Crowlands Site.

*Land, freehold (say)	£4,840 0 0
Boundary wall and temporary fencing, 9 feet high, at 20s. a yard	1,800 0 0
*Siding to works, 800 yards, at 25s. per yard, including filling up ditch and making good	1,000 0 0
*New retort-house, chimney, and apparatus complete	4,500 0 0
Two new holders and connexions for the same, including removal of present cast-iron tank for storeage	11,150 0 0
*New meter-house, meter, &c.	1,430 0 0
New boiler-house, pump-house, exhauster, and connexions	1,010 0 0
New crane	105 0 0
*NEW MAINS—	
The independent main, to connect with gasholder in Eastbank Street, 3216 yards of 12 inch, at 16s. 6d.	2,653 4 0
12-inch main from Nevill Street to Leicester Street, for town supply, 580 yards, at 16s. 6d.	478 10 0
870 yards, to Birkdale, at 16s. 6d.	717 15 0
*New purifying-house, complete	3,500 0 0
Mains in works	1,000 0 0
*New scrubbers and condensers	1,500 0 0
Cannel-shed	579 0 0
Offices, storeage, and weighing-machine	500 0 0
New tanks for water, ammoniacal liquor, and tar, elevated	450 0 0
*Wells and pipes	450 0 0
Stable and storehouse	150 0 0
*Manager's residence	430 0 0
*Offices, storehouses, photometer-room, telegraph, &c.	350 0 0
Flagging, paving, and asphalting	450 0 0
*Tar and ammoniacal liquor distillery	1,000 0 0
Contingencies, 5 per cent. on £40,043 9s.	2,002 3 5
	£42,045 13 5
Add cost for man and horse working siding, £100 a year, capitalized at 4½ per cent.	2,222 0 0
	£44,267 12 5

TABLE D.

Deductions from Cost of New Works.—Crowlands Site.

Capital Account.

Value of houses and land of present works			£3,572 4 5
,, manager's present residence and offices			510 0 0
,, materials of retort-house	£100 0 0		
,, ,, purifiers	55 0 0		
,, ,, meter-house	85 0 0		
,, scrubbers	65 0 0		
,, old mains	87 0 0		
			392 0 0
,, apparatus applicable to distillery			320 0 0
			£4,794 4 5

Revenue Account.

Saving effected in carriage by the works being one mile from Southport—					
†7843 tons of cannel and coal.					
†700 tons of ammoniacal liquor.					
——†8543 tons at 1d.		£35	11	0	
Saving cartage to present distillery in one year, 284 days at 5s.		71	0	0	
Cartage of cannel, 7842 tons at 6d.		196	1	0	
Water-rent		42	0	0	
Rent of present cannel-store at railway station		12	10	0	
		£357	2	10	
Less annual cost of carting coke to Southport, 2220 tons at 9d.		83	5	0	
Annual saving (at 22 2-9ths years purchase)		£273	17	10	£6,086 9 8

† These are an average of the probable quantities for the next ten years, each year being considered as having an increase over the previous one of 10 per cent.

Alderman HOLT moved the adoption of the committee's report, which was seconded by Councillor FISHER, and, after a brief conversation, it was agreed to postpone the discussion.

MONDAY, SEPT. 20.

A Special Meeting of the Town Council was held this day—the MAYOR presiding.

The resolution appointing the sub-committee to superintend the gas engineers in making their report having been read, the adjourned debate on the subject was proceeded with.

Alderman GREGSON moved the following resolution:—

That the report of Messrs. Veevers and Waugh be referred back to the sub-committee with an instruction that the services of Alderman Cawley, M.P. for Salford, gas engineer, or any other competent engineer, be secured, and that he, in conjunction with Messrs. Veevers and Waugh, under the direction and superintendence of the said sub-committee, with Councillors Houghton and Barrow, be requested to prepare an estimate of the cost of extending the present gas-works to a capacity for producing 400,000 cubic feet of gas per day, and of further extending them at the end of five years so as to produce 620,000 cubic feet of gas per day; also an estimate for the erection of works on the Crowlands site for producing 400,000 cubic feet of gas per day, and at the end of five years the additional cost for extending the same so as to produce 620,000 cubic feet per day.

That in case the services of Messrs. Veevers and Cawley cannot be secured, the sub-committee shall be at liberty to call in any other engineers they may deem competent, and any other persons whose services they may require.

That a competent accountant be engaged to prepare, in conjunction with the sub-committee and engineers, a tabulated statement which shall show the annual loss on revenue entailed by the necessity of providing for interest, sinking-fund, and depreciation-fund, on account of the increased expenditure of capital on the Crowlands site over the expenditure that would be incurred on the present site; also showing the loss to revenue by cartage of coke to town; the cost of man and horse for working the siding, and any other loss likely to accrue from the works being two miles out of town.

That a further statement shall be prepared which shall show the annual saving to be effected in carriage, cartage, or in any other working expenses, by the adoption of the Crowlands site, and that the fullest information possible on the whole subject be given to the council by the sub-committee, engineers, and accountant not later than the 1st of October next.

They were told by this report that it would cost about £5000 more to erect works at the Crowlands site then to enlarge the present works. This statement must have appeared satisfactory to those who would have the gas-works out of the town by hook or by crook; and he thought he was only expressing the sentiments of the whole council when he stated that if they believed the cost on the Crowlands site would only entail this additional expense, they would all hold up their hands for it. The estimates of the report before them were calculated on the principle that some time or other they were going to produce 620,000 cubic feet of gas daily, and he presumed that Southport and Birkdale would have to more than double their present size before this was done. It was not sufficient for them to know at some future time—in 20, 30, or 50 years hence—that the loss by the erection of gas-works out of the town would only be £5000. They wanted to know what the loss would be within the next few years. It might be a fact that they would require an extra 1s. rate for a few years. This report did not show in any way what would be the probable burthen on the town until the new gas-works were erected, and here was a great and radical mistake, as he had told Mr. Waugh. He also believed that the report was got up altogether on a wrong principle—it did not bring before them in a proper and business-like manner the facts of the case. The capital and revenue accounts were mixed up in such a manner that he would defy any one to come to a proper understanding of them. With all deference to the engineers, he could not possibly see how they had arrived at the facts they had done in regard to the expense of the Crowlands site, and the works there. He understood from the gas manager, in the first instance, that works would be erected for the production of 400,000 cubic feet of gas daily. As it was proposed to erect works for the manufacture of only about two-thirds the quantity of gas mentioned in the report, it was only fair to take two-thirds of the estimate given by the gas engineers. Taking this course, he could not possibly make the erection at the Crowlands site under £30,000. But he understood, from the members of the Gas Committee, that the gas manager estimated the entire expenditure on the present works, for bringing up the manufacture to 400,000 cubic feet daily, at £15,000. If this was the case, they must put down £30,000 for new works, and £15,000 for the extension of the present plant. How would this affect them year by year? Taking all the figures together, the loss would be £1559, or about a 5d. rate.

Councillor MARTIN seconded the resolution. After complaining that the sub-committee had not taken more time and trouble to investigate this business, he proceeded to contrast the estimates now before them with others that had been previously given by the gas manager, and he asked for evidence in support of the former.

Alderman HOLT, and also Mr. WAUGH, explained that the previous estimates alluded to by Councillor Martin were for double the make of gas now proposed.

Councillor MARTIN further complained that the report did not furnish a true financial statement, and that the deduction—or saving—of £6086 on the new works, though representing revenue, had been placed to capital account. He also pointed out that, in the engineers report, no calculation was made of the additional expense involved in having two gas establishments, one in the town, and the other outside. He regretted he could not speak more favourably of the efforts of the special committee in this case, but he felt it his duty to second the resolution which had been proposed.

Councillor WHITEHEAD charged Alderman Gregson with making different statements at different times with reference to this gas removal question.

Alderman HOLT disputed the correctness of the estimates given in the engineers report, and entered into a series of calculations with the view of showing that the erection of works at the Crowlands site would entail an 8½d. rate for three or four years.

Councillor HOUGHTON supported the resolution. He pointed out the unproductive capital for land, boundary wall, &c., as shown in the engineers estimates, and amounting to £12,979, should the Crowlands scheme be adopted. As to the calculation of 5 per cent. for contingencies, he contended that this item ought to be 10 per cent., and he disputed the statement that the new works could be completed by the winter of 1870-71. He referred to the extra cost of two gas-works, one out of and the other in the town, and he insisted on the absolute necessity of not only the council, but of the whole town seeing this question fairly, face to face. If it could be satisfactorily proved that the removal of the gas-works would not involve any expense which the town could not bear, he would certainly be in favour of such removal. Such removal, he admitted, would take a nuisance out of the town; but he contended it had never been proved that the gas-works had injured Southport in a sanitary point of view, and no one would ever persuade him to vote for their removal, except as a benefit to the whole borough of Southport.

Councillor BARROW said he was not afraid of the further consideration of this subject, nor did he think it at all inopportune that such a course should be adopted if there was any question as to the report before them. He differed from Alderman Gregson that they were not called on to legislate for the future, but merely for the necessities of a few years, and considered that they ought to carry their views and considerations on this subject, not to two, three, or five years, or even to ten years, but to forecast the subject to a much longer period. With reference to the engineers report, he believed it would be found that the saving as to the cost of the land on which the present gas-works were erected would be considerably more than it had been estimated. In the engineers report the maximum expenses as to the Crowlands site had been put down. There was one very important matter that was mentioned in the report, and it was a point which completely settled the question—viz., that the cost of the reversion of the land on which the gas-works were to be extended in Eastbank Street had not been ascertained. Why was this not brought into the report? It appeared that by a dereliction of duty those having the control of the gas-works had let this land, though scheduled for gas purposes, slip away, and thus he believed the council were in such a position that they had no alternative but to erect gas-works away from the Eastbank Street site. It would be monstrous, as was talked about, to spend £15,000 on a site which within a few years might be confiscated by the lords of the manor. He believed that the land required for the gas-works removal could be obtained for less than was stated. The boundary wall might not be required to its full extent for some time to come, so that a part of the amount for that item could stand over. Then the cost for new mains was too high; and so with other items, which he thought were greatly in excess of what was requisite. Taking these things into consideration, he believed that it was the wisest and most judicious policy to remove the gas-works from their present position. He was not in favour of the appointment of Mr. Cawley as a referee. He had no objection to the introduction of additional professional aid, for the result hitherto had been in favour of the policy he advocated, but he did not think that Alderman Cawley was the right man. He was also of opinion that other members of the council should be added to the sub-committee. He therefore moved the following amendment:—

That the further consideration of this subject be deferred, and that the presen Site and Cost Committee, with the addition of Councillors Houghton and Barrow be requested to continue their services, and engage further professional aid, and present a report to the council.

Alderman GREGSON had no objection to alter his resolution so as to enable the committee to call in such other engineer, in the place of Alderman Cawley, as they might think fit.

Councillor WHITEHEAD seconded the amendment.

Councillor FISHER thought that both the engineers had brought the large ideas they had gathered at Manchester and Bolton to bear upon their consideration of the wants of Southport. He did not pretend to know much about the subject, but, after examining the report, he thought that several items were excessive, and his estimate for the new works was lower than that of the gas engineers by upwards of £15,000. He thought also that several deductions must be made from the estimate for the enlargement on the present site, and therefore he hoped than the whole matter would be referred back to the sub-committee for further consideration. The council ought to be very careful when it was proposed to spend so large a sum of money. He was a firm believer in the policy of continuing the manufacture of gas on its present site.

Councillor ROBINSON thought that figures could be made to prove anything, but he could not dismiss from his mind the feeling that the removal of the gas-works would inflict a considerable burden on the town.

The MAYOR said he had not been able to examine the report and estimates till that day, but had arrived, though by a different process, at the same results as those which Alderman Gregson and Councillor Fisher had placed before the council. He was deeply interested in the welfare of the town, and he did not think that a little amount of taxation would be objected to, if it could be shown that there would be an ample return for the future.

After some further conversation, the names of Councillors Houghton and Barrow were inserted in both the resolution and the amendment, and Alderman Gregson briefly replied.

On Mr. Barrow's amendment being put, 5 voted for and 16 against it, and the original resolution, as altered, was carried.

PROPOSED PURCHASE OF THE SHEFFIELD GAS-WORKS BY THE CORPORATION.

A Special Meeting of the Sheffield Town Council was held on Wednesday, the 22nd inst., for the purpose of considering the report—an abstract of which was given in the last number of the JOURNAL—of the nominee gas directors, as to the management, especially financial, of the Sheffield United Gaslight Company; as to the advantages, if any, likely to arise to the public by such company being purchased by the corporation; and also to appoint a committee to carry out the recommendations contained in the report. The MAYOR (Alderman Moore) presided.

Alderman SAUNDERS proposed the following resolution:—

That the report of the nominee gas directors as to the management, especially financial, of the Sheffield United Gaslight Company, and as to the advantages, if any, likely to arise to the public by such company being purchased by, and placed under the control of the Town Council, now presented and read, be adopted and entered on the minutes of this council's proceedings, and that a committee, consisting of Aldermen T. Jessop, R. Jackson, J. E. Grundy, G. L. Saunders, and Councillors J. Hallam, S. Roberts, G. Wostenholm, W. Harvey, J. Fairburn, G. Barnsley, W. Clague, H. James, R. Hadfield, and J. Biggin, be and is hereby appointed to carry out the recommendations contained in the said report of the nominee gas directors, with power to take such steps for effecting a transfer of the works of the Sheffield United Gaslight Company to the Town Council of Sheffield (for the benefit of the town of Sheffield), and to take all necessary steps in preparing a bill for Parliament, and to report thereon to this council.

In moving the resolution, Alderman SAUNDERS expressed his regret that Alderman Unwin was not present. That gentleman could not say that courtesy had not been shown him; he could not say the council had not given way in every form and shape to his wishes. The resolution asking that the nominee gas directors might be allowed to prepare a report respecting the condition and management of the gas-works was on the paper six weeks ago, and the report came before the council a fortnight since. Mr. Unwin six weeks ago knew what was intended to be done, and a fortnight ago he knew positively the course it was intended to pursue to-day, and yet he was not now in his place in the council. The nominee gas directors could not shut their eyes to his absence, and, when the next meeting of the gas directors took place, they would have to ask the question how it was that Mr. Unwin, having in his hands such a large and important interest as the gas-works, having a property of about £340,000 to manage—they would have to ask how it was that the managing director of a company having such vast interests at stake, and having in his hands the interests of the shareholders as well as of the gas consumers, was not there to-day to discuss such an important question as was involved in the taking of the gas-works from the company and passing them over to the corporation. To say that he was away on pleasure would not do. A man who had to manage such a great undertaking as the gas-works ought to have been present, and he much regretted his absence, because he should very much like to hear what answer he could make to the nominee gas directors report. He (Alderman Saunders) had heard various rumours flying about as to the accuracy of that report, but he knew how the report was made, and he did not fear what could be said against it. He had heard that Mr. Unwin's lieutenant was in the council to-day, and that he would do what he required in a much better way than he would have been able to do it himself. Whether his lieutenant was there or not, all he could say was that the general, the commander-in-chief, ought to have been present too; and he (Alderman Saunders) should not place much weight upon what the lieutenant said, unless he could prove three things—that gas-works had failed in the hands of other Town Councils, that Town Councils could not make good gas, and that they could not make gas cheaper than private companies could. He was prepared to show that Town Councils could do all those three things, and had always done them. If the lieutenant, who, perhaps, had the whole matter at his fingers ends, could controvert the main facts and principles of the report, then he should at once collapse and give up. Whilst upon that point he would only further say that the nominee gas directors had had great difficulties to contend with in obtaining the information they desired. Mr. Unwin, on the other hand, had none. The whole of the clerks at the gas-works were at his disposal, to get what information he wanted; the books of the company were always open to him; he had had almost all the gas companies throughout the country to give him information; and he had had one of the ablest men in Scotland to post him up. Having all that aid and assistance, he should like to have seen the results to-day. The nominee gas directors had had to pick up their information in a number of ways, and through all kinds of difficulties; and he might here tell the corporation that, with the exception of those gas-works which were in the hands of corporations and public bodies, no information whatever could be obtained. Not one of them would make any answer to the questions which the nominee gas directors sent, and therefore they were placed in the dark as to the position of all gas-works belonging to private companies. They had therefore been thrown entirely upon those gas-works which were in connexion with public bodies. Why had private gas companies refused to give any information? Simply because they were just in the condition the Sheffield Gas Company was in. They were making enormous profits—enormous profits beyond those which were exhibited to the public view, and which they hardly knew how to get rid of. Then they had further profits in anticipation, which they could only get hold of by the issue of new shares, and they would not let any Town Council know what they were doing, for fear that the public bodies in the towns in which they were making gas would take the same action as the corporation of Sheffield were now taking, and which had been taken by the corporations of Glasgow, Dundee, and a number of other towns. He did not now intend making any speech in bringing forward the nominee gas directors report; their speech was in the report. There were, no doubt, some errors in it, because in getting up information in the way they had it would be impossible to escape having some few errors; but this would go for nothing at all against the principles of the report and the great objects to be gained. And the great objects to be gained were cheap gas, good gas, and the profits from making it to go towards the benefit of the inhabitants, either in the reduction of the rates or the improvement of the town. All this, he had no hesitation in saying, could be done without injury to the shareholders of the gas company. He and the other nominee gas directors would be the last men in the world to injure shareholders in a private company for the sake of a public benefit. They had laid their money out, and they had a right to have a fair return. But it must not be considered for one moment that a gas company was in the same position as a private company. The making of gas was a public matter. Gas had now become a public necessity like water: it had done away almost entirely with all other kinds of artificial light, and therefore it was that the public had a right and a claim upon gas and water works which they would not have upon private works used in the making of steel, iron, or anything of that kind. The shareholders could not, therefore, turn round and say, "It is our private speculation, because we cannot get anything else." What the nominee gas directors wanted was that the shareholders should be fairly dealt with, and when that was done there would be sufficient funds left for the benefit of the town to make it desirable that the corporation should get hold of the gas-works. The proposals made in the report were, he thought, fair ones—either to buy the shareholders out at a fair price, which the nominee directors did not recommend, or by granting a number of annuities. The shareholders receiving those annuities would be infinitely better off, without one exception, than they were at the present time. They would have the security of the rates and the gas-works guaranteed by the Town Council, whereas now they only had the security of the gas company, which by bad management might have its dividends reduced from 10 per cent. to 8, 7, or even 6; but there was one way of making more money which the shareholders would lose, and he wanted to prevent them from doing it—the issuing of new shares. By the Gas Act of 1866 power was given to the company to issue £350,000 worth of new shares, and those gentlemen who at the present time held £1000 worth of shares would have each £100 worth of new shares given to them. If the corporation did not get the gas-works, it would be their duty to prevent the company from issuing new shares. They could borrow £173,000, besides issuing £350,000 of new shares; and the corporation should compel them to borrow money before a single new share was issued; but the works were now in such a condition that there was no necessity for any increase of capital, to any large amount, for a vast number of years. The proposal made by the nominee directors, that the shareholders should have a certain per centage given to them in annuities, was, therefore, a very fair one. If scientific improvements took place in the making of gas, the council, having the gas-works in their own hands, would have the same advantages from those improvements that a private company would have, and they would be able to carry out the improvements and supply the improved gas just as a private company would. At a meeting last night, one of the speakers said it had been discovered that good gas could be made from sewage. Well, that being so, having the sewage of the town under their control, if they had the gas-works in their own hands they would be able to turn the invention to good and practical account. It was stated that the corporation might have to give £700,000 for the gas-works if they purchased them. The proposal at present was not to purchase the works; the idea only had been thrown out by the nominee gas directors that the works should be bought by annuities. But supposing the council determined upon buying the works, and that they would cost £700,000, what then? Were they to be frightened? Was Manchester to go on making £60,000 a year profit from its gas-works, Salford £20,000, and a number of other towns similar large profits, by running into a little risk. And were the inhabitants of Sheffield to remain poor weak people, afraid of doing anything because of what might happen, and thus lose all the advantages which were being derived by other towns. There would be no risk if the council bought the gas-works, and paid £700,000 for them—£200 for every £100 share—because the shares were now paying 10 per cent., with a large flood of profit beyond: profit for the reserve-fund; profit to pay unnecessary officials; profit on works of all sorts; profit frittered away. And it must be frittered away, because unless that were so there would be no necessity for the issue of £350,000 worth of new shares to pay 10 per cent. If they decided upon purchasing the works, the council could borrow the money at 4½ per cent., and if they gave £200 for every £100 share, the interest would be only 9 per cent. Upon that calculation there would be an advantage of 1 per cent., as the shares were paying and would still pay 10 per cent. If the committee he asked for were appointed by the council, he hoped they would make the gas company a fair and liberal offer; and if such an offer were made the gas company should come forward and say, "For the good of the town we will yield up our works, providing we suffer no loss; pay us a fair and remunerative return for them and the outlay we have spent, and let us settle the matter in an amicable and passive way." He hoped they would do that, because, depend upon it, the works would have to pass over into the hands of the corporation. A fight would only entail an expense and a loss, both to the company and the town, and they might depend upon it that it would be an idle fight in the end. The best way for the company to act was to fairly come forward and say, "Pay us a fair and just sum for our works." Let the council see what was a fair and just sum; let an arbitration decide what was the fair value of them, and then let the two parties go to Parliament and amicably get a bill to settle the matter. On behalf of himself and the other nominee directors, he desired to say that they had no feeling about Mr. Unwin or any of the other directors; certainly he had none against Mr. Unwin in any form or shape. The matter was a public one, and it was brought chiefly before their notice because Mr. Unwin made a statement to the effect that the town should never have the works. The nominee gas directors had not said a word against him personally, nor against any of the other directors; but they did say that the appointment of Mr. Unwin's son as the engineer of the company was a most improper and unjust one. However, every father would take care of his son, and very justly so. Though they had no charge to make against the directors, there were many things which he could say with regard to their management of the works—for instance, with regard to the Sales of Gas Act, and the compulsory depositing of money at the works when parties required to be supplied with gas. Those things, however, were all passed over by the nominee directors. The proposal which they now made through him was for the good of the town, and in the interest of the shareholders, and he hoped it would have a unanimous vote. Let the matter go into the hands of a committee; he had no hesitation in saying they would make a fair offer for the gas-works, and would be able to prepare such a bill as Parliament would pass without a moment's hesitation. They might depend upon it, if the committee made a fair offer to the company, and they refused it, Parliament would say to the representatives of the company, "Here is a fair offer made to you for the benefit of the public; as you will not accept that offer, we must give the town the power of compelling you to accept it."

Mr. HALLAM (one of the nominee directors) seconded the motion. From his own experience as a director, and from the information he had obtained in assisting to compile the report, he was convinced the council would act fairly towards the shareholders of the company if they got the gas-works, and greatly to the benefit of the town. He was also convinced that, even if the council paid 10 per cent. interest for the works, they would have a large surplus to go towards the improvement of the town.

Alderman CARR opposed the resolution. He reminded the council that it was only a few years since they were asked to take the course against the water company which they were now advised to take with regard to the gas company. Their doing so caused them to incur a debt of £4000. A much worse bill was obtained than would have been the case if there had been no opposition on the part of the council, and they completely destroyed all the friendly feeling which ought to exist between such public bodies as the corporation and the water company. If they did what they were now asked to do, they would incur a debt of many thousand pounds, and he was convinced they would do no good. If they had the gas-works they would not be able to manage them in the excellent way they were now managed: indeed, they would soon be very much mismanaged. There would soon be a large increase of salaries, and to meet that increase the price of gas would have to be raised 6d. per 1000 feet. He could place no dependence upon the statistics which had been brought forward by Mr. Saunders in his report. He had stated that the price of gas in Liverpool was a certain sum, when in reality it was 3d. per 1000 feet more, making a difference of £10,000 or £15,000 per annum. Several other of his statistics were upon a similar footing. He (Alderman Carr) could see clearly enough that they were going to put the town to a large expense—£4000 or £5000, or perhaps £10,000—without doing any good, and on that ground he should vote against the proposition.

Mr. HARVEY said his experience led him to the conclusion that the inhabitants of the town were almost unanimously of opinion that the corporation should take to the gas-works; indeed, there never was a time when they were so unanimous. That being so, he regretted that Alderman Carr should take the view he had, because there was no member of the corporation who had tried to do more for the benefit of the town than Alderman Carr had. He gave Mr. Carr credit for being present and expressing his opinions, and said it was a disgrace to many members of the aldermanic bench that when so important a question as this was under discussion they

should have stayed away and have been conspicuous by their absence. With regard to purchasing the gas-works, he was of opinion they should have purchased them 20 years ago. He had no doubt whatever that there was the same amount of talent to be got in Sheffield as in other towns, and, therefore, he had no fear about the gas-works being successfully carried out by the corporation. He did not for one moment dream that the shareholders would negotiate in a friendly spirit. He happened to know some of the gentlemen at head-quarters, and he knew they would not give up till they were compelled—it was too good a thing, and they could not blame them for it. He regretted Alderman Unwin did not feel it to be his duty to be present, but perhaps he had nothing to say, and therefore thought it useless to come.

Mr. Wood thought no shareholders of the company should be on the committee. Mr. Wostenholm, whose name appeared on the list, was a shareholder, and he would suggest that Mr. Hutchinson's name be substituted for that of Mr. Wostenholm.

Mr. Nadin approved of the course it was now proposed to take, and referred to the fact that, in 1861, he moved for a committee to take into consideration the desirability of purchasing both the gas and the water works, a motion which Alderman Fisher then described as the most wild and Utopian that was ever brought before the council. He (Mr. Nadin) had since seen no reason to alter the opinion which he at that time expressed, that both gas and water works should be in the hands of corporations; and, if the council had supported him in his endeavours to get the water-works, they would not be in the humiliating position in which they now appeared. Wherever gas-works were in the hands of corporations large profits were made, out of which improvements were effected, the pockets of the ratepayers were saved, and better and cheaper gas was supplied. For instance, at Bury, a town of about 37,000 inhabitants, the corporation took to the gas-works, for which they paid no less than 10 per cent. to the shareholders, but yet £4000 out of the profits went each year towards the improvement of the town. At Halifax the gas-works were in the hands of a private company, and were estimated to be worth about £17,000, but, so determined were the council to have them, that, though they were really worth only £12,000, they gave £37,000 for them, knowing well enough that, in the course of a few years, they would be repaid the capital they had spent. At Rochdale the works were purchased, in 1844, for £27,000, and since that time, out of the profits which had been made, no less than £25,000 of the purchase-money had been repaid, and £40,000 had been spent in improvements. At Carlisle the price paid for gas in 1844 was something like 6s. 8d. per 1000 feet. At that time the works were in the hands of a private company. The council took to them, paying £43 for every £23 share; and what had been the result? The price of gas had been reduced from 6s. 8d. to 3s.; about £8000 had been spent in improvements; about £4000 of debt had been paid, and £2000 had been put by as a reserve-fund. If such things as this could be done in small towns of 30,000 or 35,000 inhabitants, would not the profits in large towns be much greater? In Birmingham there was one of the richest gas companies in the kingdom, as it had £700,000 share capital. That company got powers to lay their mains to Walsall, and they commenced doing so in 1855. The price of gas supplied from the Corporation Gas-Works at Walsall in 1849 was 7s. 6d. per 1000 feet; but as soon as the Birmingham Company began to lay their mains in the town they reduced the price to 3s. 6d., and ultimately to 2s. 2d. Yet, notwithstanding that great reduction, £20,000 of the profits had been spent in improvements, and the corporation was not in the Bankruptcy Court yet. He was of opinion that if the corporation of Sheffield were backed up by the inhabitants of the town, the gas company would give in, providing they were paid a fair and remunerative price for their works. He thought 10 per cent. might be paid to the shareholders out of the profits, and that even then there would be another 10 per cent. to go towards the improvement of the town.

Mr. Weston was not opposed to the corporation taking to the gas-works, but he was afraid if they came into their hands there would be more paid in salaries to officials than there was now. With regard to the constitution of the committee, he objected to three members of St. Peter's Ward being on it and none from Upper Hallam, and he would suggest that Mr. Bramall be put on the list.

Alderman Saunders: Mr. Bramall is on.

Mr. Weston said he would also suggest the name of Mr. Hutchinson in the place of Mr. Wostenholm, and Mr. Wood in the place of Mr. James, who was the youngest member of the council.

Alderman Saunders: He's put on, too.

Mr. Weston said if profits were to be made from the making and sale of gas, those profits should go towards the improvement of the town, instead of the poor ratepayers being everlastingly called upon; but rather than pay an enormous and extravagant sum for the old works, he advocated that they should ask Parliament to allow them to build works of their own.

Mr. Allott said when the matter was first brought forward his impression was strongly in favour of the corporation purchasing the works. He was not a shareholder, nor interested directly or indirectly in the gas company. He had, however, felt bound to inform himself more fully on the matter, particularly as to the statements in the reports of the nominee directors. He had, therefore, carefully gone through the official reports of the company for the last ten years, and also the newspaper reports of their meetings. At one of those meetings Alderman Saunders laid down the rule that "the report of a public company ought to bear upon the face of it the truth, and nothing but the truth." So also should reports presented to the council; and he very much regretted to find, in the report of the nominee directors, many statements which did not fairly represent facts. Alderman Saunders admitted that there might be errors of an odd thousand here and there, but said they did not affect the main question. Then why were they put in? The statements in the report of the accounts of other companies should be correct, or the inferences drawn from them must be worthless. He happened to have personal knowledge of some of the towns named, and several persons whose names were mentioned were his intimate friends. He had therefore taken the liberty of asking for information as to whether the statements contained in the report fairly represented the facts of the case in those towns; and he would trouble the council with a few quotations from the letters he had received. But, first of all, he wished to set Mr. Nadin right with regard to Walsall. This was his native home, and instead of being four and a half miles from Birmingham, it was eight or nine. With regard to the statement in the report as to Walsall, he would read a letter from Mr. Wilkinson, the town-clerk of that town:—

> The extract from the report you sent me does not convey a correct interpretation of my answers to the queries sent to me; indeed, I think I have ground for complaining of what are in truth little, if anything, less than misrepresentations. The figures quoted represent merely the total receipts and expenditure of the year ending September, 1868, nothing having been said about profit. A considerable deduction would have to be made from the balance to cover depreciation of plant, wear and tear of meters, &c., &c. The total salaries and wages, in the same period, amounted to £2169 16s. 4d. The £249 mentioned in the extract, is the amount paid to two only of the officials. I send you a copy of the Gas Committee's report in 1867, when the rates for gas were reduced to their present scale. The general body of consumers are charged, as you will see, 2s. 6d. per 1000 feet, whereas the extract makes it appear that the price is 2s. 2d. The Birmingham and Staffordshire Gas Company can scarcely be said to supply a considerable portion of the town with gas. The majority of the inhabitants support the town works. The works were established under the authority of an Act of Parliament obtained in 1848. The total outlay upon capital account is about £40,000, the mortgage debt being about £12,000; the cost of various enlargements and extensions having been provided by transfers, from time to time, from the revenue account.

The statement as to the "£28,000 paid off entirely out of the profits" was scarcely consistent with the letter of Mr. Wilkinson. There were other instances which he could give, but he would not occupy the time of the council. With regard to salaries, he said that, including the increases which had been given, those paid at Newcastle now amounted to £1400, instead of £1050 as stated in the report. As to the price of gas, Sheffield had been put in comparison with a great number of towns, and Liverpool had been stated at 3s., whereas he had a letter from Mr. King, informing him that the price of gas within the parliamentary borough was 3s. 3d., and beyond the boundaries of the borough 3s. 7d. No discount was allowed, and the illuminating power was to be not less than 20 sperm candles. Then in one place the price of gas at Newcastle was put down at 2s. 6d., and in another at 3s.; Walsall in one place was set down at 2s. 4d., and in another at 2s. 2d. The illuminating power of gas at Birmingham was under that of Sheffield considerably, the figures being—Birmingham, 14·82, against Sheffield, 16·17. Two figures had also been put down as the profits derived by the Bury Corporation from their gas-works; which of them was right, and which wrong? Another point he had to refer to was that the report set forth that there were a number of questions to answer, but he could not find any questions, and therefore he did not know the answers. Then, with regard to the statistics, he found there was not a date given. In Sheffield the figures related to the time from the 31st of December, 1867, to the 31st of June, 1868, but that was not bringing it down to the latest possible period. As to the capital expenditure during the last ten years, he found the total amount expended in buildings and plant, and in amassing reserve-fund, was £66,000; and the sum of £60,000 was mentioned as paid to the Sheffield Consumers Gas Company when it was amalgamated with or purchased by the Sheffield United Gaslight Company. At that time the works were in a very dilapidated condition, and he was informed that the whole of that £60,000 had been paid out of revenue, and that the works were now in a satisfactory state. That appeared to him inconsistent with the statement that the gas directors had managed their affairs with wasteful extravagance. He objected to the term being used in a report which might be referred to in entering into negotiations with the company, if the present proposal was to be carried out. With regard to the price of gas, he must remind the council that, although Sheffield was in the midst of the coal district, it was not possible to obtain on the spot coal of the best quality for making gas. The cannel coal would be too expensive for making gas in this part of the country. The standard had, however, been raised to a minimum of 15, and, if that was not satisfactory, the company ought to have been requested to raise it still higher. According to the reports, he observed the illuminating power had ranged at about 16·7; at Leeds it was higher, but the cost was greater. He thought the past conduct of the company did not justify the remark that "the history of the Sheffield United Gaslight Company, with the exception of the last three years, has been one of war and antagonism to the public interest and wishes." He could hardly consider this "in the highest degree courteous" to the directors of the company. He was perfectly willing to entertain the question of purchasing the works of the gas company, but did not think the right way to begin was by abusing the directors, and accusing them of sacrificing the public interests to their own selfish ends. He had been somewhat startled to find how different this was from the language held by Alderman Saunders himself, as well as by other nominee directors, at the meetings of the company. [Mr. Allott read several extracts from the speeches of the mover of the resolution and other nominee directors in support of his position.]

Mr. Harvey objected to the introduction of these personal matters, saying they had nothing to do with the question now before the council.

Mr. Allott said he was answering the statement in the report, that the course of the company had been one of war and antagonism to the public interests. He maintained that that was a point upon which the nominee gas directors were best qualified to pronounce, and the conflict between the past and present statements of Alderman Saunders was, to say the least, very extraordinary. Alderman Saunders was even wrong with regard to the amount paid for salaries during the year to which his figures related; the amount being £1775, not £2300, as stated. The report which the council was asked to adopt recommended the purchase of the works of the gas company. He had no objection to that if it could be shown to be for the public interest. That, however, he doubted, and he had pointed out the inaccuracies of the report in order to show that it could not be relied upon as proving the case for the purchase. The whole argument of the report was based on the assumption that the profits of the manufacture and sale of gas would be appropriated to public improvements and the reduction of taxation. He did not deny that in some instances considerable advantage had accrued from the transfer of such works from private companies to public bodies, but it was extremely improbable that such a result would be obtained here. The last transfer of the kind was that of Dundee, in 1868. In that case the gas-works were transferred not to the corporation alone, but to a number of commissioners, appointed partly by the corporation and partly by the other public bodies in the town; and, instead of the profits arising from the sale of gas going to the improvement of the borough, they would be applied to reducing the price, and the corporation would get nothing at all. That stipulation was imposed by Parliament. If they went to Parliament with the view of getting hold of the money for town improvements, they would be opposed by the gas consumers, who would say that they had a right to the benefits of the increased profits, and that they, and not the ratepayers, should receive it. To this there would be no answer, for there was no doubt the consumers had a perfect right not to have the cost of town improvements saddled on their shoulders. He was afraid there would be no such conditions imposed on the town as had been done in the case of Dundee, and he could not see how the town would be benefited by the transfer.

Alderman Carr remarked that they would be able to spend £5000, and that would satisfy them.

Mr. Allott proceeded to point out the costliness of the process by which the transfer could be effected, and observed that since the passing of the Act for the purchase of the Dundee Gas-Works in 1868, arbitration had been going on, and had already cost no less than £30,000.

Mr. Harvey: That is almost a year's profits.

Mr. Allott concluded by stating that he did not think the council was in a position to pass the resolution in the form in which it had been pre-

sented. He did not believe they would be able to accomplish the transfer by peaceable means, and he objected to the adoption of the report because it contained reflections. He should, therefore, propose as an amendment—

That the report of the nominee gas directors as to the management, especially financial, of the Sheffield United Gaslight Company, and as to the advantages, if any, likely to arise to the public by such company being purchased by, and placed under the control of, the Town Council, now presented, be received and entered upon the minutes of the council's proceedings; and that the same be referred to a committee, consisting of the mayor, the ex-mayor, Alderman Laycock, Alderman Vickers, Alderman Jackson, and Alderman Fisher, with the request that they will examine the statements contained therein, and seek an interview thereon with the elected directors of the gas company, and report to this council as to the desirableness or otherwise of carrying out the recommendations of the nominee gas directors.

Alderman CARR said he had very great pleasure in seconding Councillor Allott's amendment.

Mr. WOODCOCK supported the original motion, and hoped the council would enter earnestly into a struggle by which so much could be accomplished for the benefit of the town.

Mr. BEAL thought the subject ought to be fairly grappled with as a financial question. The gas company had spent £344,000, which, at the present market value, would be equivalent to somewhere about £700,000. No one must delude himself with the idea that they would be able to get off paying that money. It was anticipated in the report that they would have to pay the gas shareholders by annuities. Well, then, £30,000 of the earnings of the Corporation Gas Company would have to be reserved to pay the interest of that money. As far as the town was concerned, they would have to pay that in perpetuity. The gas consumers would have to pay as much of that £344,000 which had been spent when it passed into the hands of the corporation as now, and the only advantage to accrue to the public would be in respect of the future outlay of the company. In twenty years £200,000 might be wanted for improvements, extensions, and alterations. If it remained in the hands of the gas company, the public would have to pay 10 per cent. on the outlay required; but if the gas-works came into the hands of the corporation, there was no doubt they would be able to borrow the money at 4½ per cent. This was the advantage to be gained in the step they now sought to take. There had been a great deal of wasteful expenditure in unnecessary extension of works, purchase of property, and other things. With regard to salaries, he remarked that, with all due respect to Mr. Unwin, he was of opinion that if that gentleman felt himself getting into years, and unable to do his work as usual, he should have paid his son out of his own increased salary of £1000 a year, or partly so. He must also object to the idea that the corporation could not manage the works for the benefit of the public as well as a private company could. The evidence given lately in Parliament was to the effect that, with regard to Glasgow, it was much better managed in the hands of the corporation. As to salaries, they knew that in one case, where double the quantity of gas was made, only half the sum Sheffield paid in salaries was expended, so that argument was worth very little.

Mr. HARVEY: Three of our men get £2000.

Mr. BEAL said a great deal of Mr. Allott's speech had been made up of small talk in disputing various statements in the report, which it was quite likely were after all as correct as they could be obtained, considering the difficulty of getting information of that kind. Although the price of gas was not a question which should have so much weight in determining about the purchase of the gas-works, yet as an attempt had been made to make political capital upon the Sheffield gas being as cheap as that of other towns, it was well to put the matter in its true light. The report, however, met that admirably. It was of no use talking about the price of gas being 3s. 3d. in Sheffield without they also took into consideration the illuminating power. It was quite true the price of gas in Glasgow or Edinburgh was 5s., but the illuminating power was 32 candles instead of 16, as in Sheffield; so that gas was quite as cheap in Glasgow as in Sheffield. Perhaps gas here could not be made of much better quality from the coal got in this immediate neighbourhood, but if they could not have it better they ought to have it cheaper. The facilities afforded here were most ample, and, in fact, if it were necessary, the gas company might sink for coal from their own premises. Taking all the circumstances into consideration, he should rather object to give unlimited power to the committee to go to Parliament; but he quite agreed in the desirableness of having the matter thoroughly gone into at once, with the view of bringing about a speedy realization of what they now hoped for. The committee should be at once appointed, and instructed to report to the council at the proper time, before they actually went to Parliament. They must not rush into a thing of this sort without mature consideration, and due attention ought to be paid to so serious a question. It was quite clear that there were some wrong impressions in the public mind. He did not think the corporation of Sheffield could do a very great deal for some time to come, but they might prevent extravagant outlays and having to pay 10 per cent. for them.

Mr. JAMES said he thought Mr. Allott's defence of the gas company a laboured one, and had not touched the main question for the consideration of the council. There was no doubt that the corporations of other towns had effected great good by getting the gas-works into their own hands, and what had been done in other places could be done in Sheffield. The report amply proved the desirableness of the transfer being effected for the benefit of Sheffield, and they ought to work earnestly and unitedly in bringing about the desired change. It was, of course, most important to take into consideration the illuminating power along with the price of gas, and by doing so they would see at what a great disadvantage Sheffield was placed in this respect.

Mr. CLAGUE had fully come to the conclusion that it would be for the benefit of Sheffield to have the gas-works in the hands of the corporation. He certainly did object to the present management of the gas company, and thought there was great room for amendment both with regard to price and illuminating power. In Manchester they were paying 4d. per 1000 less than in Sheffield, in proportion to the quality, and in Manchester the corporation had been able to do a great deal in improving the town out of the profits. He was bound to say the report now under consideration was one of the ablest ever presented to the council. There might be some slight errors, but taken as a whole it was truthful, and could not be refuted. One point he objected to, with regard to the present management, was as to the margin allowed to large consumers. He consumed from 200,000 to 300,000 feet per year, but he had no reduction, whilst those who consumed 500,000 feet, and were, therefore, considered dangerous customers, as being likely to make their own gas if necessary, were allowed a reduction of 6d. per 1000, or 16 per cent.; so that the smaller and middle-class consumers had this to pay for in the increased price charged them. If the transfer could be effected peaceably, all the better; but if not they must go to war. For his own part, he had been respectfully treated by the company, and he had a great respect for Mr. Unwin, but in this matter he had not the slightest hesitation in deciding as to what course ought to be pursued. If the gas-works had been in the hands of the corporation during the last ten years, they might have built a town-hall with £100,000, they might have spent another £100,000 in widening High Street, and £50,000 in other improvements. If they could get the gas-works in the hands of the corporation now, he was sanguine of their being able to reduce the district-rate soon, for they could borrow money at 4½ per cent., instead of paying 10 per cent., and even by giving the gas shareholders £200 for every £100 share they would be reaping a great advantage for the town.

Mr. ROBERTS, as a nominee gas director, recommended the council by all means to pass the measure. They had been utterly powerless to stop the waste of money, for they were always out-voted if they opposed the large expenditure. He had himself advised Mr. Unwin not to press for a salary of £400 to be given to his son, but it was carried in spite of the protest which the nominee gas directors made, and certainly the better course for the town to pursue was to get the works into the hands of the corporation.

Mr. WRIGHT believed the proposal to get the gas-works into the hands of the corporation was thoroughly right in principle, and as to the application of the funds, the Government would not be very likely to interfere, but leave it in the hands of the council to decide.

Mr. HUTCHINSON, whilst admitting that the gas company had made great mistakes, was of opinion that the Town Council were not likely to conduct the business any better, as indeed past experience had shown. As to their ever expecting to make a profit out of the gas if it got into the hands of the corporation, it was a perfect fallacy. Before they took a step of that sort they must consider well the cost of purchase. They would not only have to pay 10 per cent. to the shareholders—that was on the £688,000 down—but also the prospective value must be taken into consideration. No doubt the matter would be submitted to arbitration if they got their bill through Parliament, and in the end they would find they had much more to pay than was reckoned upon. They must remember that Sheffield was already heavily taxed, and it would be very wrong to bring upon the town the burden which might possibly be caused by such an undertaking. As to the quality of gas, cannel coal would cost about 10s. per ton more, so that it seemed out of the question to use it unless they reduced the profit from 10 per cent. to 7½ per cent. He did not see that the corporation had done anything they ought to be proud of, but they had done a good deal they might be ashamed of, so he had not very much hope of them succeeding too well with an undertaking of that sort.

Mr. CARTER thought time should be taken to obtain fuller information before deciding upon a question of that magnitude. In his opinion the proper course to pursue would be to go to Parliament and ask for powers to make their own gas. He thought they should ask to be allowed either that privilege or the power to purchase the old works.

Alderman GRUNDY inquired what course had been adopted by Alderman Saunders in collecting the information contained in the report, and whether he had much difficulty in obtaining it.

Alderman SAUNDERS explained that printed forms had been sent out from the town-clerk's office, and the answers were returned upon them. He then proceeded to reply to the observations of the opponents of the motion. With regard to the opposition to the water company, he said it was wrong to suppose that no good had been effected for the town, inasmuch as they had succeeded in getting the 25 per cent. limited to 25 years, instead of rendering the town liable to it in perpetuity. As to the supposition that the corporation could not manage the affairs of the company properly, he asked whether it was not likely that nine gentlemen could be found in that council who would manage the work as well as the nine share directors of the present company. It would be a reflection upon the council to say there were not. It had been proved in the House of Commons that gas-works in the hands of corporations were managed more cheaply and better, and there were large benefits accruing to the various towns. As to what had been said with regard to the number of officers required, he remarked that if the gas-works were in the hands of the corporation, they would be in the hands of the public. If the ratepayers became dissatisfied with the management, it would be in their power to have an alteration. He agreed that they might go to Parliament with two schemes; but, if they went only for new works, Parliament would say they had better buy up the old ones. He proceeded to reply at length to Mr. Allott's objections, and in the course of his remarks said that Mr. Allott seemed to have forgotten that the money put down to the depreciation-fund, for the purchase of new works, and for alterations and extensions, really belonged to the profits. The profit, he held, was all that was earned beyond the annual expenditure required for making gas and keeping up the works, together with the cost of management, &c. He explained the figures which had appeared in the report; and, with regard to the prices of gas in the various towns, he read over a list which had been published, showing that Sheffield gas, though charged less for than some other towns, was in reality much dearer, owing to its inferior quality. As to the standard which had been fixed for Sheffield, he said it was the result of a compromise, or, doubtless, if it had been otherwise fixed, a higher standard would have been insisted upon. Referring to Dundee, he explained that the arrangement with regard to the commissioners was one which had been sought by the town, and the restrictions were imposed in compliance with the request made by the promoters of the bill. He contended that Mr. Allott had failed to say anything to lead the council to hesitate in passing that resolution; and with regard to Mr. Hutchinson's remarks as to prospective value, he reminded them that it had already been decided that there was no such thing as prospective value in these matters. Ten per cent. was the maximum dividend fixed by the Act of Parliament. There could be no more, and that was all the shareholders could claim upon. With regard to the present resources of the company, he said that one retort would produce daily 3125 cubic feet of gas. The company had now 820 retorts, and could, therefore, produce 2,562,500 cubic feet daily, or 932,750,000 cubic feet yearly. The present works were, therefore, capable of producing double the quantity of gas without spending a penny upon new works. But the directors were already engaging in works which might entail enormous expense. In one part of the town they were putting down 4½-feet pipes, for which he considered there was not likely to be the slightest use, even if the consumption was to increase very largely. All they wanted was, however, to spend sufficient money to give excuse for calling up more capital. As to the amendment which had been proposed, he said it was all very well to try and put off that matter, but the fact was that the opponents of the proposition sought to drive it too late to go to Parliament this year. He urged the council not to delay it, but to at once appoint a committee, in order that a bill might be prepared for next session. Nothing would be done without the consent of the council, and when the committee should have prepared the bill there would be ample opportunity afforded for a full discussion of it.

Upon the amendment being put to the vote, only three voted for it.

The original motion was then put, and carried by a large majority.
On the votes being recorded, there appeared—

For the motion	28
Against	4
Majority	24

ON THE EFFECT OF ATMOSPHERIC AIR WHEN MIXED WITH GAS IN REDUCING ITS ILLUMINATING POWER.

By B. Silliman and Henry Wurtz.

[From the *American Journal of Science and Arts.*]

The data given in this article were obtained during an investigation of the hydrocarbon gas process by the "Gwynne-Harris" or "American" system, some notice of the results of which we propose to publish in a future number of this journal. In the course of this investigation it became important to measure exactly the effect of atmospheric air in reducing the illuminating power of gas. Owing to a mechanical defect in the apparatus connected with the exhauster, it was found that a variable quantity of air had for some time found its way into the gasholder, the influence of which in diminishing the brilliancy of combustion was sufficiently conspicuous before the cause was ascertained. The only experiments on this subject known to us when its study was undertaken by us, were those of MM. Audouin and Bérard.* By these results the ratio of loss in illuminating power by the addition of each 1 per cent. of air appeared to us so enormous, that we were desirous of confirming them. Subsequently we became acquainted with an important paper on this subject by Mr. Carl Schultz,† the main points of which are reproduced in this article, as they appear to have escaped attention; the author having modestly given us only his initials.

In conducting this research we soon found that the attempt to introduce by measure a given volume of air into the gasholders connected with the photometric apparatus, was attended with many sources of error, and that the requisite accuracy could be obtained only by the eudiometrical analysis of each successive mixture.‡ The apparatus employed consisted of two gasholders of 10 cubic feet capacity each, connected in such a manner that each could be used independently, or the contents of one transferred to the other and back again, to secure a complete admixture of the contents. The air was introduced by opening a stop-cock connected with the interior and adding weights to the counterpoise, measuring the influx by a centesimal scale of equal parts attached to the drum of each holder. This rude admeasurement was controlled by an analysis of each mixture. This required also the prior analysis of the street gas on each occasion. Columns 3, 4, and 5 of the accompanying Table 1, show the results of these mixtures as made known by the eudiometer. The illuminating power of each sample was determined by the Bunsen photometer, on the average of 15 successive observations of one minute each, with the usual corrections. Columns 6 and 7 give these results, and in columns 1 and 2 will be found the corresponding densities determined by diffusion.

Table I.

Dates.	Densities.		Composition.			Illuminating Power.						
Gas of Manhattan Company, New York, 18th St. Station, from Street-Mains.	Density of Street Gas.	Density after Air was added.	Air found by Analysis in Street Gas in 100 Volumes.	Air found by Analysis after the addition.	Volumes of Air added.	Candle Power of Street Gas before addition of Air.	Candle Power after addition of Air.	Candle Power of Gas alone, Air being deducted.	Loss of Candle Power by Air added.	Per centage Loss of Candle Power.	Ratio of Loss in Candle Power in per centage Volumes.	Loss of Candle Power for each One per Cent.
1859.												
Mar. 17	401	409	1·96	3·01	1·05	15·12	14·20	14·96	0·92	6·08	5·79	·723
,, 18	392	405	3·15	4·97	1·82	14·67	13·27	14·40	1·40	9·54	5·24	·511
,, 23	401	421	1·50	3·75	2·25	14·71	12·96	14·37	1·75	11·82	5·25	·582
,, 19	387	419	1·61	4·61	3·00	14·81	12·49	14·46	2·32	15·69	5·23	·656
,, 19	387	433	1·61	6·54	4·95	14·81	11·28	13·76	3·53	23·88	4·83	·501
,, 19	387	467	1·61	13·32	11·71	14·81	8·67	13·07	6·14	41·46	3·54	·419
,, 20	387	490	1·61	17·79	16·18	14·81	6·29	12·41	8·52	57·53	3·55	·378
,, 23	403	525	1·12	21·88	20·76	15·09	4·09	11·96	11·00	72·90	3·50	·377
,, 20	401	551·5	1·61	26·29	24·68	14·11	2·18	10·52	11·93	84·55	3·42	·380
	1	2	3	4	5	6	7	8	9	10	11	12

Gas burned in a 5-feet 15-hole standard Argand burner.

Since the air added in each case is rendered *as gas* by the meter during the photometric measurement, it is important to determine the illuminating power of the gas alone, after deducting the known volume of air present. The results of these calculations are given in column 8. In columns 9 and 10 the loss of illuminating power is given: in 8 in terms of the candle power lost for each admixture, and in 9 this loss is stated as a per centage. The ratio of loss of illuminating power in per centage volumes of gas and air is given in column 11, and in column 12 is the loss of power corresponding to each 1 per cent. of air added.

The results of the analysis and photometric measurements are more conspicuously seen in the curve projected from columns 5 and 10 of the table upon the annexed diagram, on which the vertical and horizontal scales are as 1 to 3.

[This curve we are unable to reproduce, and must refer to the original.]

The following inferences depend upon the data herein given, viz:—

1. For any quantity of air, less than 5 per cent., mixed with gas, the loss in candle power due to the addition of each 1 per cent. is a little over 6-10ths of a candle (·611 exactly); above that quantity the ratio of loss falls to half a candle power for each additional 1 per cent. up to about 12 per cent. of air; above which, up to 25 per cent., the loss in illuminating power is as shown by column 12 of the table—nearly 4-10ths of a candle for each 1 per cent. of air added to the gas. In column 11 of Table 1, the ratio of loss in candle power is given in per centages for the several volumes, while in column 10 the destructive effect of air upon the illuminating power is most conspicuously exhibited, 12 per cent. of air destroying over 40 per cent. of the illuminating power. In the diagram this loss of power is represented by the numerals in the right-hand column, which are inverse to those in column 10, and stand with the maximum intensity=100.

2. With less than one-fourth of atmospheric air, not quite 15 per cent. of the total illuminating power remains; and with between 30 per cent. and 40 per cent. air, it totally disappears.

Now, during December and January the hydrocarbon gas made at Fair Haven had often as much as 12 per cent. of air in it; during the month of February the air by analysis averaged nearly 9 per cent; while in March, after the separation of the pump from the exhaustion apparatus, the air was reduced at times to nearly nothing. By column 3 of the table it will be observed that the air found by analysis in the street gas at the Eighteenth Street station of the Manhattan Gaslight Company, New York, averaged nearly 2 per cent., and the New Haven city gas contained about the same quantity. We allow, therefore, this quantity (2 per cent.) as a normal amount of air in street gas; and consequently in the journal of the daily operations with the hydrocarbon process at Fair Haven,* these corrections have been applied; giving in two columns the "corrected candle power," by the addition of the ratio determined in our Manhattan experiments, and the "corrected volume," or yield per pound of coals carbonized, air being deducted. It is obvious that the records of the station-meter give the contaminating air as gas, and without the correction thus obtained the apparent yield is too great.

In large gas-works the liability to contamination by air accidentally introduced by various causes diminishes in proportion to the total make of gas, and an amount of air which, when diffused in a very large volume of gas, becomes insignificant, if confined to 10,000 or 15,000 feet daily product will become a most serious injury to its illuminating power. This cause of deterioration in gas has been overlooked almost entirely by gas engineers; but in small gas-works it deserves special attention, and we have no doubt that the low illuminating power too often obtained in such works is largely due to this cause.

Results of MM. Audouin and Bérard.—We have already alluded to these results obtained by MM. Audouin and Bérard, which form part of an important memoir published in 1860, under authority of the French Government, "Upon the Various Burners employed in Gas Lighting, and Researches on the best Conditions for the Combustion of Gas." Their table, which we append for the sake of comparison, shows a considerably higher ratio of loss than we have obtained, being rather more than 6 per cent. loss for each 1 per cent. of air added to the gas, reaching a total loss of 80 per cent. with 15 per cent. of air added; while we obtain 57·53 per cent. loss with 16 per cent., and 93 per cent. loss with 20 per cent. air, while with the latter volume of air added we get 72·90 per cent. loss. These differences may be accounted for by the French trials being made upon a gas of not more than 12-candle power, our trials being made on a gas averaging nearly 15 candles. Also by the fact that in the French experiments the gas was burned from a bat's-wing burner, ours from a standard Argand.

In the experiments of MM. Audouin and Bérard, two gasholders of equal capacity were filled, one with standard gas, and the other with the same gas mixed with 1, 2, 3, &c., per cent. of air. Each fed a burner of the second class, regulated to a consumption of 140 litres of gas per hour. The illuminating power of the two was compared by making that of the pure gas equal unity. The results are given in the following table, where each figure gives the mean of 6 or 8 concordant observations:—

Table II.

Table showing the Results of Mixture of Air with Gas, by MM. Audouin and Bérard.

Common Gas.			Gas mingled with Air.				
Intensity.	Size of Flame.		Quantity of Air per 100.	Intensity.	Intensity, Loss of	Size of Flame.	
	Height.	Breadth.				Height.	Breadth.
	mm.	mm.				mm.	mm.
100	49	92	1	0·94	6	43	102
..	48	92	2	0·89	11	42	100
..	49	93	3	0·82	18	42	97
..	48	94	4	0·74	26	42	94
..	46	94	5	0·67	33	42	96
..	45	93	6	0·56	44	41	95
..	48	93	7	0·47	53	44	94
..	48	93	8	0·42	58	39	94
..	46	94	9	0·36	64	39	93
..	47	95	10	0·33	67	38	89
..	46	93	15	0·20	80	35	86
..	45	92	20	0·07	93	33	86
..	45	92	30	0·02	98	26	79
..	..	..	40	0·01	99	21	60
..	..	..	45	0·00	100	18	47
..	..	..	50	0·00	100	12	24

By this table it appears that the introduction of 6 to 7 per 100 of air suffices to diminish the intensity by one-half, and a mixture of 20 of air with 80 of gas leaves almost no illumination. Unfortunately MM. Audouin and Bérard do not record the actual illuminating power of their standard gas, which, however, we are led to believe cannot be more than 12 candles of the English and American standard.

We have already alluded to the experiments of Mr. Carl Schultz, and annex below a summary of his results.

Mr. Schultz concludes from his experiments that the loss of illuminating power due to the addition of air to gas is about one-half of one candle for each 1 per cent. of air added. He makes the very remarkable observation, that, within limits, the addition of air to *very rich* cannel gas, up to 12 per cent. of air, was followed by no loss of illuminating power, but, on the contrary, by a small gain. Thus Boghead cannel gas, giving for 88 per cent. gas an illuminating power of 27·47 candles, or for 100 per cent. gas 31·32 candles, with 12 per cent. of air gave 28·29 candles; showing that 12 per cent. of atmospheric air had increased the illuminating power of the flame by 0·82 candles. These results are obtained only by the use of an Argand burner. By substituting an intensity burner for the Argand, the results obtained with gas from Boghead conform to the rule of half a candle loss for each 1 per cent. of air. (The Rev. Mr. Bowditch also states generally that "impurities are far less destructive of light in Argand burners.")

Mr. Schultz sums up his results in the following propositions:—

* Ann. de Ch. et Phys., 3rd series, vol. lxv., p. 423, 1862, and translated in the Journal of Gas Lighting, vol. xi., pp. 733, 799, 830.

† *American Gaslight Journal*, Aug. 1, 1860, p. 41.

‡ Our labours in this research have been greatly aided by the facilities courteously extended to us by the officers of the Manhattan Gaslight Company in New York, who with great liberality placed at our disposal their well-appointed experimental laboratory and apparatus at their Eighteenth Street station.

* "The Hydrocarbon Gas Process." Report of working results on a large scale under the Gwynne-Harris patents, November, 1868, to May, 1869, by Benjamin Silliman, M.A., M.D., and Henry Wurtz, M.A., New York. 8vo., pp. 126. Printed for private distribution.

1. When coal gas is mixed with atmosphere air, its illuminating power for all 5-feet burners is reduced in the proportion of half a standard candle to every 1 per cent. of air present, except in case of very rich gas burned with a 15-hole Argand.

2. One cubic foot of atmospheric air will destroy an amount of light equal to 10 English standard candles, during one hour.

3. This loss being constant, the per centage of aggregate loss will vary with the illuminating power of the gas used.

While our results confirm in general those of Mr. Schultz in 1860, and of MM. Audouin and Bérard in 1862, it is obvious that the ratio of loss, with equal increments of air added to a 15-candle gas, is by no means constant. The difficulty of obtaining exact results by the method of mixture of measured volumes is so considerable, especially with quantities below 10 per cent., that the only safe control of the results is that which is obtained by eudiometrical analysis of the several mixtures tested, as was done by us in all cases both before and after the addition of air. It is obvious that the surprising loss of intensity by the addition to illuminating gas of small per centages of air must be owing not merely to the interior combustion due to the presence of oxygen, but still more, probably, to the associated nitrogen, which acts not only as a diluent, or deductive quantity, but its specific heat is an actual *divisory* function in diminishing the flame temperature. The interesting observation, first made by Mr. Schultz, that in very rich cannel gas there is actually an increase of intensity within certain limits, due to the presence of oxygen, suggests another series of experiments with successive additions of oxygen to a gas of high illuminating power, which we propose to undertake at our early convenience, as also another series upon mixtures of progressive quantities of carbonic acid.

May 17, 1869.

NOTE.—Erdmann's photometer (*Gasprüfer*) depends on the use of air to destroy the illuminating power of gas. Elster has employed this instrument in a series of researches undertaken to determine the theoretical illuminating power of different materials (*Journal für Gasbeleuchtung*, Munich, 1862, p. 384, *et seq.*). After removing the illuminants by sulphuric acid, he found that ordinary illuminating coal gas required 150 volumes of air to destroy completely the yellow flame of 100 volumes of gas. If the amount of light obtained by the addition of 1 per cent. of olefiant gas to the decarburetted gas employed in a definite burner, is called *one candle*, it was found necessary to add 6·5 per cent. of air to destroy the illuminating power of this gas containing 1 per cent. of olefiant gas or to destroy one candle power. As a like quantity of carbon, carried to a white heat, produces always, in a gas burning from the same burner, the same quantity of light, and it requires the same quantity of air to transform it into carbonic acid, we may regard an ordinary 12-candle gas as a mixture of an unknown non-luminous gas, holding in suspension during combustion a quantity of white-hot carbon, equivalent to 12 per cent. of olefiant gas, and requiring, consequently, a quantity of air equal to 210 volumes for 100 volumes of gas (88 into 15+12 into 6·5=210). Each additional candle power requires an addition of 5 volumes of air, as the constant indicated by these results of Elster.—*Translated from Schilling, French Edition of* 1868.

In the use of the Erdmann apparatus, it is found that the volume of air required completely to destroy the illuminating power of coal gas ranges from 188 to 245 volumes per 100 volumes of gas, varying with its richness.

These results, it will be observed, harmonize in a satisfactory manner with those obtained by us, as embodied in Table 1.

Every chemist will at once recur, also, to the action of air upon gas in the Bunsen burner in constant use in all laboratories provided with gas—an instrument identical in principle with the *Gasprüfer* of Erdmann.

ON THE EXAMINATION OF WATER FOR ORGANIC MATTER.

By R. ANGUS SMITH, Ph.D., F.R.S., &c.

[From *Memoirs of the Literary and Philosophical Society of Manchester*, vol. iv., 3rd series. Communicated, with emendations and alterations, by the author, to the *Chemical News*.]

In 1865 I received a request to write on the organic matter of water. I wrote a memoir, which was, without intending to be published, extensively circulated among officers of health, especially in India.

I there made a division which was entirely new to chemists. The substance styled "organic matter," instead of being given as one to which little or no definite meaning was attached, was considered as existing chemically under at least seven different headings, not forgetting the numerous organized forms which it might assume. These divisions were—

1. The organic matter decomposed, or putrid.
2. Organic matter readily decomposed, and probably ready to become putrid.
3. Organic matter slow to decompose.
4. Recent organic matter.
5. Old organic matter.
6. Vegetable organic matter.
7. Animal organic matter.

The first was known by the gases which instantly decomposed permanganate.

The use of the permanganate of potash, recommended by Forchhammer for ascertaining the organic matter of water, has been tried and admired by some, and found entirely wanting by others.

I endeavoured to show, in the memoir alluded to, and in a subsequent paper, how far that salt could be trusted; quite certain of its value for ascertaining bodies of the first and second classes, but having no experience of my own which would guide me to consider it a sufficient test for the total quantity of organic matter.

Bodies of the third class I was therefore inclined to estimate quantitatively, by drying and weighing, afterwards ascertaining the condition of the matter as the point of most importance.

Organic matter of the fourth class was estimated by the amount of nitrites in the water, because their existence showed that the matter was oxidizing, but had not had time to comple the action.

Bodies of the fifth class were estimated from the nitrates, as in that case the action was finished.

Bodies of the sixth class were reckoned from the absence of bodies of the seventh class, which latter class, again, were considered to exist when they were accompanied by an unusual amount of chlorides, supposing care to be taken to discover that other sources of chlorides did not exist.

It is not to be expected that any of these divisions should be sharply defined; but the one most difficult to decide upon, to all appearance, is really that which I have found, with proper precautions, scarcely ever to fail me, though it has been used in hundreds of instances, and for many years—viz., the test for animal matter.

Dr. Woods had written on the use of Forchhammer's chameleon previous to the publication alluded to, and about the same time Professor W. A. Miller; but I am not aware that any one endeavoured to distinguish the various conditions of the organic matter. I am, and was, desirous of showing that organic matter is not necessarily hurtful; we speak of it in water as an evil, to be measured by the balance, whilst there is as much difference in the qualities of that found in water as there is between good wholesome meat and putrid flesh.

I was desirous also of showing the true value of the permanganate, which is capable of acting on one, but scarcely on the other, and of being used for analysis for sanitary purposes, although not for all the demands of the chemist.

Dr. Frankland next took up the subject, and proceeded to show the amount of organic matter, or of sewage matter, which might flow into a stream; and this he did by estimating the nitrogen gas obtainable from the organic matter of the water. By ascertaining the amounts existing in the water supplied to a town and flowing in the sewage, he found the total thrown out by the inhabitants.

For this he made an organic analysis of the residue of the water, and by a very beautiful arrangement, using Sprengel's pump, he drew out the nitrogen for measurement. I do not doubt that this mode adopted by Dr. Frankland will always be useful, and will remain permanent as a method, but not for constant use, on account of the time required, excepting by those chemists who perform many of such analyses, and have the apparatus in constant readiness. It is, however, always pleasant to find an addition made to our capacity for accuracy, and especially when such beautiful methods are employed.

By this means Dr. Frankland obtains the organic nitrogen, nitrates and ammonia being removeable. I have not generally estimated the latter, as being still more unstable than the former, and I have frequently found it to disappear with great rapidity, affording by no remnant any clue to the past. Urea and uric acid must also be excluded from the organic nitrogen before we obtain a clue to the albuminous matter. I think, however, that we require to know, above all, whether this matter is in a state to putrefy, or to produce living forms. If there are organic germs capable of development in a visible form, that condition ought not to be neglected.

Immediately, I believe, after this plan was adopted by Dr. Frankland, Mr. Wanklyn discovered a mode of decomposing albumen by permanganate of potash, obtaining ammonia.

This process was used by Messrs. Chapman and Miles Smith. I shall not attempt here to give the exact amount of honour due to those gentlemen, or to tell precisely the boundaries of their labour.

The result seems to be, that the nitrogen may be obtained without the trouble of the usual organic analysis, although it may be uncertain which process takes the longest time.

Mr. Wanklyn considers that he can, by his method, first remove the ammonia which exists as such, by boiling with carbonate of soda; next, by decomposing the albumen with permanganate of potash and boiling in caustic potash, obtain the ammonia resulting from the decomposition. This is a decided gain to us, and may turn out to be the normal mode of separating the ammonia of the putrescible and unputrescible organic bodies.

We are rather apt, when we find a method of analysis, to look at it as final. I shall endeavour to show how much we obtain by Dr. Frankland's method, and how much by Professor Wanklyn's. I shall perhaps also, as in such cases, be inclined to show that my own method reveals a greater amount of the peculiarities of water. It makes more divisions, is more complicated, therefore, in one respect; but every point tells its own tale, and it is the number of tales we have to tell regarding the history of water that measures the fulness of our reports. I shall probably adopt all the methods for a time.

In the paper mentioned, I pointed out the error of supposing that organic matter was all equally unwholesome, or that it was, in all cases, even in the slightest degree so. It was the custom too much to confound the simplest peaty and the most noxious putrescible matter. On this subject I may here quote the paper.

"*Quality of the Organic Matter.*

"Water manifestly containing organized matter is to be avoided; but it may frequently be purified by some mechanical mode of separation, such as simple straining.

"If the water contains organic matter in solution, or a condition approaching in all appearance to solution, it may be wholesome or unwholesome. The mere existence of organic matter is no proof of impurity. We must know if it brings animalculæ or vegetable life or products of putrefaction. We must know the *quality* as well as the quantity. If the matter is peaty, consisting of the ordinary humous class of acids and salts, the colour may be very dark and the water very unpleasant to look at, without being in any way, so far as I have ever heard, injurious to health, although such water cannot be quite so wholesome as pure water, since the oxygen of solution is diminished. The taste and other sensible qualities will be the chief guides.

"If the matter is wholly or nearly colourless, it may still be wholesome or unwholesome. It may, for example, contain the juices of plants of a wholesome character. If these juices are fresh, they may do no injury; but they will not long remain fresh, they will putrefy. Water containing organic matter ready to putrefy ought to be avoided, as we cannot tell when the moment of danger begins; whilst the quality, at best, is never known to us exactly.

"To ascertain the nature of the organic matter, the water is allowed to stand for a day or two, in which case it may be found that organized bodies show themselves.

"Sometimes plants seem completely to fill the vessel, having come out of a moderately clear solution. When standing, in this case, the water must be prevented from evaporating, and it must be in glass, so as to be exposed to light; a temperature suiting vegetation is also to be given. Animalculæ may appear in great numbers; they are an indication of nitrogenous matter, and one proof of the presence of substances capable of putrefaction. It may be that some form of putrefaction will be the only result; but whether this occurs alone, or along with organized forms, an excess of organic matter is proved.

"Water that will not bear the test of standing will, in most cases, be rejected at once. If no other can be obtained, it ought to be used before the putrefactive process has begun; but this is very dangerous. The next best method is to wait till after putrefaction has terminated, and the products are separated as much as possible. This is popularly known to be the case when the water has for some time become clear and colourless, and free from smell and taste. There are some difficulties connected with this. Water undergoing putrefaction is manifestly unwholesome. After putrefaction is completed, it may be quite wholesome. Although the process is proved by Pasteur not to begin without the aid of organic germs of some kind, they seem to be of a class constantly existing in the atmosphere, even when it is wholesome, whilst we have reason to believe, from the results, that germs of disease, if there are such, are decomposed, like other albumenoid substances, during the action. It would, therefore, be probably safer to wait till putrefaction was completed, but this is often tedious. At any rate, it was intended to state that, when activity began, it was not safe to use the water. The points of safety and of danger require investigation.

"Water with green organic matter in suspension or semi-solution is generally full of germs of living things, and nauseous to the taste.

"A microscope is very useful in detecting the smaller forms of life, but not always essential. Good water is clear and colourless, or only slightly browned by peat. Clear bright water shows no microscopic objects. It is

quite a mistake to suppose that all water contains animalculæ. Those who have sent abroad this saying could not have known what pure water is.

"If the signs of organic matter are clear, it may not be needful to go further, but to reject the water at once. After standing for two or three days, varying with temperature, and showing nothing to the eye except a little film of green on the bottom of the vessel, we may conclude that not much organizable matter is there. We may then proceed to the chemical examination."

Some years ago it was customary, more than now, to examine with the microscope water intended for the use of towns. Attempting at one time to join the chemical and microscopic together, as they were too much in separate hands, I came to certain general conclusions:—That no ordinary pure water produced much vegetable or animal life, and that microscopists were mistaken in allowing people to suppose that every drop of water was inhabited; that nevertheless water, generally considered very pure for drinking, might contain some forms not possessed with distinct locomotion; that whenever distinct locomotion began, especially among soft-bodied forms, the water was more than suspicious; that forms increased with the quantity of organic matter containing nitrogen, until the amount was so great as to cause gases of decomposition which eventually stifled life. How far this stifling of life proceeds I do not attempt to say. I suppose it will not apply to the mucedines, which cause putrefaction to commence.

If the water was impregnated with sewage water (as the Thames at London, for example), bad cases excepted, the amount of vegetation which spread over the sides of a bottle filled with it and set in the sun, was so great as to give the appearance of one solid mass. If the water were taken from the river above Reading, the amount of vegetable matter was seen as a delicate green colouring at the bottom of the vessel; and if it were taken up at the source, no greenness whatever appeared, but, after long standing, minute crystals of limestone. If the water contained sewage, the phosphates and magnesia were generally found collected in some form of the *Navicula*, frequently in large groups of the *Navicula fulva*, and with it also was found phosphoric acid and magnesia. It was sufficient to note the condition of the water with relation to these deposits to ascertain at what part of the Thames the specimen was taken; and without the examination of these deposits, I do not consider that it would have been possible to obtain a distinct idea of the nature of the organic matter present. It is, however, needful that we know the general character of the water; had we a specimen from another situation and found no deposit whatever, it would have been very unfair or very unwise to conclude that it was similar in quality to that from the source of the Thames. It might have been saturated with nitrates, and even a large amount of organic matter not capable of taking the forms alluded to. Perhaps, however, nitrates prevent decay in water as in meat. As the germs of the lower forms of life may pass by us unobserved, it is necessary that we should give them time for development, in order that they may become sufficiently prominent to attract our attention. For this reason I consider it an imperfect examination of water when this is not attended to, in cases at least where we have not the slightest idea of the nature of the water. We find water with less than two grains of organic matter per gallon giving rise to forms by no means agreeable to look at in our food, and water with several grains of organic matter giving rise to no such forms.

It is true that we cannot tell which of these living forms are most dangerous; we cannot tell which of them, if any of them, produce either cholera or any other disease; but we can say that water which contains them may contain the elements of disease, whilst water which does not contain them or matter to make them is innocent. So far as this we are obliged to go at present. It was for these reasons that I have not recommended the method of estimating the total nitrogen in water. I was inclined to believe that the danger arising from water could not be measured by the amount of organic matter, or even by the amount of nitrogen in the organic matter.

Still it is of advantage to estimate the nitrogen of the organic matter, in order to compare the state of one source of water from day to day, as, for example, Dr. Frankland does so frequently in the case of the Thames. It is not, however, the organic matter only that gives out nitrogen; that is given out by ammonia and nitric acid; and these must also be estimated when seeking albumenoids. And this course is adopted by Professors Frankland and Wanklyn.

We may now inquire how far all these bodies together will give us the amount of the organic matter falling into the water.

When azotized compounds decompose and form ammonia, how long is this ammonia retained in the water? On examining a very putrid stream, I estimated the amount of ammonia at the most putrid portion, where carburetted hydrogen was passing off in great volumes, and where a cubic foot could be obtained in a very few minutes by stirring.

In the sewage stream of which I have spoken the amount of ammonia was from ·5 to ·7 gr. per gallon. After going 14 miles, the amount was only ·07, and, after 20 miles, none at all was found. To say none at all, is to go far, but it was not found by the mode adopted for the others.

The mud of the same stream was in a state of putrefaction, and contained, per cent.:—

Ammonia	0·797
,, a mile lower.	0·420
,, at second mile	0·171

The ammonia rapidly disappeared, and the mud itself diminished very greatly in amount.

I estimated that one grain of ammonia evaporated, in some seasons, from every square foot per hour.

In taking sewage water to the land, I think it very important that the movement should be as rapid as possible.

The water, in its passage of 20 miles, has lost its valuable ammonia, and that within two or three days. This is a sufficient proof that we must not trust to the ammonia as an indication of the amount of organic matter which has been present, as it is as rapidly removed as the organic matter is decomposed; that is to say, the length of time necessary for complete putrefaction is, under favourable circumstances, no greater than the time afterwards required for the removal of its products. In inquiries on putrefaction, I have found the temperature 12·2° Cent. a marked one. Putrefaction may be said to begin actively at that point, and the results here given would, probably, be very different below that. In this water there was no moving life to be observed; but the estimation of the organic matter would have shown no difference, whether vitality had been present, and the substances had been capable of entering into active and unwholesome forms, or had been ready to break up into instantaneous putrefaction, or had been preserved, like a mummy, in carbolic acid for a thousand years.

From this observation regarding the ammonia, we are clearly led to beware, in our schemes of irrigation by sewage water, that the land shall be overflowed before the ammonia is thoroughly formed, or else, if the ammonia is formed, that it shall not be subjected to loss by long exposure to evaporation.

We see, also, that nature provides here for the complete obliteration of organic matter. It ceases altogether to be found in the water. It may be traced, either as such, or as ammonia and carbonic acid, long after the bubbles of carburetted hydrogen have ceased to appear, until, at last, it dwindles down to an amount which is rather difficult to remove from water, and which, so far as we know, may be utterly disregarded.

In the passage of organic matter, we may observe, from figures soon to be quoted, that the volatile and organic matter diminished from 9·33 grains per gallon down to 5·04, even when there was an increase of fixed matter, and that the decomposing matter in solution diminished still more rapidly, in the ratio of 283 to 17. The use of the word decomposing matter is not quite correct; it means the substances in solution, arising from decomposing matter and absorbing oxygen at once. It must be observed that the time required was two to three days; and I may add that I could not have drunk the water at last, but there was great foulness to begin with. Still, it shows great removal of impurity.

The organic matter having left the water, we may next inquire whether any trace of its existence remains behind. That trace we do find in the increased amount of alkalics, sulphates, and chlorides.

The alkalies and alkaline salts, but especially common salt, are prominent. The whole of the common salt which has been used as food, without the slightest loss, is found in water, when vegetation has not removed it. The sulphur has become partly oxidized, leaving sulphates, whilst some may have left in company with hydrogen. Phosphates have been increased for a time; but they rapidly fall, taking lime and some magnesia with them; and, on the whole, the great change to be observed in the water is connected chiefly with the alkaline salts. The most stable and most constant of these, without loss, is common salt.

On this subject, I may quote what has been said elsewhere regarding the chlorides as an indication of the presence of animal matter, proper regard being had to the absence of other sources, which, in this country, are chiefly connected with artificial circumstances. "The absence of the chlorides, especially, may be considered as the certain absence of sewage matter, and their amount to be estimated as an indication of the comparative amount of sewage matter from day to day, in cases where sewage only pollutes the river. I conclude from these data that the organic matter and the nitrogen in it are equally incapable of giving us a sufficient history of the water. We may draw another conclusion—that nature has provided a mode in certain conditions for its perfect removal."

It is worth while to ask whether this purification by putrefaction is not the most complete method; it seems to destroy that which we consider to be germs, which germs may be a beginning of any disease of the most terrible form. Having read most that I can find on this subject, I have been led to think that the water, before and during putrefaction, may contain the diseases that have been washed from cities, but that the air above, containing the gases and vapours, does not contain the germs of these diseases, although, of itself, it is extremely loathsome and decidedly unwholesome. It is rapidly purified by the atmosphere. However, I reason from the facts obtained by others, since disease is not my study. After complete putrefaction and clearing, the water seems to be used with impunity. Our rivers, however, seem too small to purify large quantities in their course, as, even in warm weather, the time must be measured by days if the specimen given is a fair one. I do not pretend to say how much may be allowed to go into a river of a given size without fear, but this may be found, as, after all, every river has some sewage from animals, and, in this country, even from man also.

If the water were allowed to clear itself by standing, producing whatever amount of organic life could be developed from it, the germs might be increased in number, instead of being diminished. It is proper to observe that the liquids must be included. The solids contain little chlorine. The water above might remain very clear, but might be, nevertheless, very dangerous. In such a condition, water seems to be best purified by filtration through the soil, which simply means extremely slow and careful filtration, accompanied with partial oxidation; in that case, the water coming from under the soil would be fit again for use, although it would contain, and does contain, the alkaline salts alluded to.

Waters from rich lands, unless from very deep drains, always contain more organic matter than water from hills, and more albumen, or matter so conditioned that it is capable of assuming a great variety of living forms with and without locomotion. Water from the hills of Scotland and Wales, Cumberland, and many parts of North England, gives rise to no variety of living forms; and, in many of them, there is scarcely anything to be remarked in the deposit, unless opportunity is given for collecting it from a large quantity of water, and concentrating. On studying this subject many years ago, I found that, in some of those cases where the water was peaty, there was also to be found a large amount of ammonia. The words I used were these—"In a peat bog which is not well drained, and is, therefore, wet and cold, the acids of the peat do not become dissolved so as to form a very deeply coloured solution, but they form a solution of a pale yellow. But in grounds which are warmer, or, what is better, well drained, the amount of soluble matter is very great. The colour of such water is not to be confounded with the water which heavy showers bring down, filled with mud and bits of peat; it is often perfectly clear and bright, but brown like coffee. The acids in solution at such times are kept so by the presence of ammonia. Ammonia dissolves them in large quantities, and along with them also the salts which they form with lime, magnesia, soda, phosphates, &c.

"Plants begin to grow in warm weather; at this time ammonia is formed. It is at this time the organic matter decays, and, in its approach to inorganic matter, passes through this stage of ammonia.

"The peat mould Mulder has shown, but he has not mentioned this excess of ammonia."

I supposed at the time, as it appears, that the ammonia produced by the decomposition of vegetable substances was used for the solution of the ammoniacal humates of Mulder. The paper read was only a short note, intended to call attention to an important and curious point—the amount of ammonia on those bare hills. I have had the subject before me frequently since that period—namely, 1847—but have never given it all the time required for its elucidation. Lately, Professor Wanklyn and Messrs. Miles Smith and Chapman have examined the hill waters, and have rather alarmed the public by informing them that they contain more albumenoid matter than waters coming from rich plains. The process they adopted has, no doubt, shown two conditions of the nitrogen; and it is possible that one may be albumen; but it seems perfectly clear that it is not putrescible albumen. I had long ago found the nitrogen; it still remains to find out all the conditions of its existence. If waters containing nitrogen from the hills are allowed to stand, they neither show their nitrogen by the production of living forms in proportion to the amount of that element, nor by putrefaction; any fear, therefore, of such results may be entirely put out of our minds. The living forms, which are the most dangerous, are fewer than from pretty deeply filtered water of the plains; and putrefaction cannot exist when the matter to putrefy

is so minute; when the solutions are extremely weak, oxidation overpowers it. Such, at least, is my experience.

A reason for believing that nitrogen exists as albumen is the large amount of fish which the water supports. But protein exists in many conditions. The learned originator of the word had the idea of the prophetical and changeable Proteus in his view, as well as the rank of the substance as first in importance, because it forms man. I think, however, the probability is that the earth acids keep it from change, united to the generally low temperature on the hills. This latter, however, does not seem needful. These soils, saturated with peaty water, are not to be compared to flat, wet, and ague-bringing grass and other lands. I find the process of Professor Wanklyn still more valuable since I wrote the above, although I adhere to the reasoning that, although he may be right in believing albumenoids to be present, the water is not, to that extent, hurtful. The same applies to the reasoning, as I understand it, of Dr. Frankland. But we need not quarrel; it is enough if we each try to elucidate the subject.

Let us now consider what does take place during putrefaction. In all cases known to me, the first thing that occurs is the diminution of oxygen in the air absorbed by the water, and, to a more or less extent, the production of sulphuretted hydrogen, which, however, may exist in the water to a very small extent at a time, being rapidly converted into combined sulphuric acid when oxygen can be found for the purpose.

In Loch Katrine water, the oxygen found in the absorbed air by Dr. Penny was equal to 31·69 per cent.; that of the Manchester water is equal to 27 per cent. In the Liverpool water, at the bottom of the reservoir, the amount fell to 12 per cent., being equal on the surface to the Manchester. In the first case, as well as in the second and similar cases, the amount of oxygen is too great to allow of putrefaction; and in the third case it was very clear that the oxidation was a process of decolorization, at least in part, whatever else may have occurred. This decolorization is caused by the oxidation of the *humus*, and its removal as carbonic or other acid.

The gases of pure water contain nearly 34 per cent. of oxygen.

Dalton found cistern water almost entirely deprived of its oxygen; and I have found every per centage of oxygen from 34 downwards.

I go further into this point in my chapters on water, which I hope to bring out soon. Meantime I may say that the examination for oxygen is a very important one.

Another important feature in putrefaction is the occurrence of carburetted hydrogen. The carbonaceous or organic compound, having lost the ties that bound it together, is broken up into fragments. The carbon, when it can find oxygen, goes off in its company, but otherwise it leaves with hydrogen; separate, however, it must, and that with considerable violence. When there is a great amount of oxygen these decompositions of organic matter do not take place; and even if the Loch Katrine and other water were largely supplied with organic matter, putrefaction would be entirely absent, as it now is, as long as the high amount of oxygen was kept up in continual presence.

That organic matter does exist in peaty water to a larger extent than in streams not peaty, but still offensive, may be taken for granted. A very brown water contains about 4 grains per gallon. It is extremely dark indeed if there are 6 grains; but, without peat, putrefaction, or, what is worse still, the development of mischievous germs, may occur, whilst in the other they seem stifled. How far this disinfecting and preserving quality of peaty matter will act in weak solutions I cannot tell; but in its greatest strength—that is, surrounded by the matter of the peat itself—preservation may exist for an indefinite time, and the non-occurrence of putrefaction in weaker solutions may be considered sufficient to show that there is abundant antiseptic power for the amount of matter to be preserved in these waters.

But the question still arises—What is this organic matter containing nitrogen? If it is albumen, it is disinfected if the peat is great in amount; and it is incapable of putrefaction if the oxygen is great.

We are not perfectly sure that these ammoniacal humates of Mulder's actually exist in the form he mentions. It may be that the nitrogen is otherwise combined, giving another mode of explaining the conditions of the water. If they are combined, as Mulder believes, we have only to allow oxygen to enter the brown water and be absorbed, a process which readily occurs; the *humus* is bleached, and the ammonia is free to combine with carbonic acid, and readily to dissolve a fresh portion of the same salts of which it formed a part. If the nitrogen be otherwise combined, whether as albumen or any similar substance, the oxygen would still play a corresponding part.

By this view of the subject, the brown waters would be giving off carbonic acid, freeing and losing some carbonate of ammonia. When oxidation takes place, a certain acidity is found, coupled with a little bitterness, a quality possessed by great portions of the waters of the hills. This, I believe, occurs in those waters which have not been purified by descending deep into the earth (where thorough oxidation and sweetening take place), but which have passed only over the surface, and been partially oxidized. The complete oxidation produces carbonic acid; the restricted oxidation an acid that is not volatile, and is extremely bitter. I have prepared so little of this, that I am unable to give a good account of it. It was formed from extremely brown water, chiefly from the river Avon, in Lanarkshire. By its formation the water became very bright; when boiled down, the acid became stronger to ordinary tests, and its bitterness became more intense.

I may remark, by the way, that in all the bottles in which this occurred there was a deposit of very fine flakes of silica, leading me to think that, by our usual modes of estimating that substance, we are apt to make the amount too small. I believe this acid to be the origin of that bitterness which I have so often observed on the hills; and even in the very brilliant water from the hills, the two processes have been going on at the same time—the formation of carbonic acid and the formation of the non-volatile acid.

Apparently there are times, perhaps flood times, when the water does not become oxidized so much as usual, and then we find the bitterness as a result in a greater degree. Although I had observed this for many years, I had not known that the effects might be hurtful to those who drank the waters. I met this year, accidentally, at Oban, Professor Frankland, who told me of some gentlemen who had been very much inconvenienced, and who actually took supplies of spring water with them to Inverness, at which place they had found the river to cause diarrhœa. I am not aware that this disease is more frequent at Inverness than elsewhere; but the water, or at least the substance in it, to which I allude, seems to be unwholesome to those who have not been accustomed to use it.

Chloride of calcium is observable in water from the clay slates of the west of Scotland, at least in some places. It is found also in Loch Katrine water, although I have not seen it mentioned.

For some years I was inclined to believe that the bitter taste was owing to these salts, until I found it increased by oxidation. I am not prepared, however, to say that they are incapable of modifying the taste, although they exist in quantities very minute.

Taking this view of the case, water collected in the mountains is very different from that which has run down into the plains. The age of the water also is a matter of importance, and if kept long in deep reservoirs or in shallow reservoirs.

If in shallow reservoirs, the water may be uniform throughout; if in deep reservoirs, the oxygen may never be able to permeate to the bottom. At a depth of 20 feet I have found more than twice as much organic matter as was to be found on the surface, whilst the lower specimen was of a much deeper brown. This was in the Rivington reservoirs, as already said.

Water that comes down very rapidly may never be able, in a practical period, to have the organic matter thoroughly oxidized. Water which purls down rather slowly, falling, nevertheless, over many rocks, is always clearer, although the reason partly of this is, that such water is not surface only, but has drained through the soil.

Peat itself, if distilled with fixed alkalies, gives out ammonia. I suppose there is no doubt that some of this arises from the decay of vegetable albumen, some of which may be retained in the peat, but its mode of decomposition is still a problem; it seems to take place chiefly by oxidation, not putrefaction. I was inclined to think that a notable amount of the ammonia might be taken by the acid waters direct from the atmosphere.

But the smoke of peat, or rather the oily matter deposited by the smoke, contains nitrogen compounds, very probably the bases obtained by the decomposition of that vegetable albumen, which will not enter into fermentation, or expand itself into the lower and dreaded organized forms, although compelled to yield to the action of fire. This shows that all the nitrogen does not exist as ammonia. Although Mulder is highly to be honoured for the work performed in endeavouring to elucidate the subject, and especially the question relating to *humus*, it is not easy to agree with him. If, however, any one would begin where he has left uncertainty, some reward would be found.

I give a few quotations from Mulder's "Physiological Chemistry," first German edition:—

"I repeat that the ammonia in the soil, as in the natural saltpetre grottoes of Ceylon, is formed from the atmospheric air, the oxygen of which, instead of forming nitric acid, changes the organic substances into ulmic acid, then into humic acid, geic acid, apocrenic acid, and into crenic acid."

P. 158. "This formation of ammonia from the constituents of the air and water is of the highest importance for the growth and success of the plant. It is the cause which converts the insoluble organic constituents of the soil into soluble substances, and thus presents them to plants as organic food, even when no ammoniacal manures are added besides, to convert the five mentioned acids into soluble salts of ammonia."

P. 166. "Ulmic, humic, and geic acids, however formed, possess the power of absorbing ammonia and water to the extent of several per cent. The quantity given out (at 140° C.) is between 8 and 16 per cent. It requires 195° to free them from water."

P. 167. "The power of ulmic, humic, and geic acids to condense ammonia is so strong, that the acid made by acting on sugar with hydrochloric acid almost always contains ammonia if air is not kept away."

P. 169. "These acids combine so intimately with ammonia, that they have the character of an organic compound of four elements; by treatment with potash at a higher temperature they lose the ammonia completely."

In the "Handwörterbuch der Chemie," under "Humus," it is said that by constant digestion with hydrochloric acid ammonia was not removed. It is also added that, boiled with an alkali, the ammonia is not removed.

This accounts for the opinion held by Berzelius and others, that nitrogen existed in these earth acids; and certainly it is not clearly shown that they are only ammoniacal salts.

Berzelius gives Hermann's old analysis of crenic acid as containing nitrogen; and, until we can finally settle the composition of these substances, we may be allowed to doubt. Whatever the compound be which contains nitrogen, its disinclination to putrefy must lead us to believe that even the organic nitrogen is not a measure of the dangerous quality of water, whether that nitrogen exist in a non-putrescent condition or association of the albumen, or in a substance removed a step from albumen, and passing downwards to a condition more allied to the idea of an inorganic body. My own belief is, that part of the ammonia is in combination with earth acids, and part of that which we find is obtained by destroying an albuminous substance rendered non-putrescible by its surroundings.

I have given my reasons for believing that neither the nitrogen of ammonia nor the other nitrogen found in peaty water can be taken as the indication of the amount of putrescible matter. At present, I believe, we have no idea of the actual relation in which it stands to health. It will be interesting to know now if the nitrogen of the nitrates and nitrites is at all similar. These salts are not formed when putrefaction is going on rapidly. The reason is very simple: the water is then deprived of its oxygen. We do not know all the conditions of the formation of these salts: but one is essential—that oxygen shall be present.

In the Thames water, at least two miles below and above Hungerford, there was nitric acid in considerable abundance in 1848. It is mentioned, in evidence given in a parliamentary inquiry twenty years before that, that red fumes rose on heating the deposit. I quote from memory.

In 1848 this was certainly the case. In later analyses, by Dr. Hofmann, the nitric acid was not mentioned. I considered this at the time a mistake; and I examined the water again, finding, however, extremely little nitric acid, and, I believe, in some cases none.

Having examined other putrid streams, and found no nitric acid, I conclude that it had disappeared from the Thames also when it became more impure than previously.

During the time that river was so offensive near the Houses of Parliament, the organic matter must have wholly or nearly deprived of its oxygen the air in solution. Running streams, however, do not, so far as I know, contain much nitric acid; that substance is formed in greatest quantity by the action of porous bodies. The oxidation is assisted by the pressure to which the gas is exposed by being brought in contact with a great amount of surface, as well as of numerous surfaces contributing to the result. For these reasons nitrates are found best in soils through which azotized matter in solution is slowly passed.

I had occasion to make experiments on this point, and showed in a paper to the British Association in 1848, that a filter might be made to form nitrates from putrid matter.

An interesting question arises—Does the nitric acid indicate the amount of organic matter which was previously in solution?

If nitrates are put on land, they are decomposed by vegetation, and the nitrogen is retained. These salts act both as food and air to plants. The water which flows from drained land may contain nitrates, but they are not a measure of the amount put on the land; and, if they result from the organic matter there, they are still not in proportion to its amount, as, even after they are formed from vegetation, they may be decomposed by it.

Nitrogen, therefore, may be removed from water either as ammonia, or organic matter, or nitric acid, every trace of it finally disappearing. Those nitrates, however, which do remain indicate that at least an equivalent of albuminous matter or sewage matter did exist.

Another interesting question occurs—Is the nitric acid removed without vegetation? I believe that it is so.

In water from drained fields vegetation is generally found, though frequently in very small quantities. In the soil around drains it is found in considerable quantities; but after putrefaction has occurred, in the Medlock, at Manchester, I have not found it. The oxygen seems to be removed as the oxygen of the air is, probably leaving nitrogen to pass off as gas.

As the nitric acid indicates an equivalent of albumen, I have put it down as telling us of the previous presence of organic matter; in other words, of old organic matter. The word "old" has no relation to time, except so far as to mean older than that from which the nitrites are formed, and the original organic matter. The nitrites, not being fully oxidized, are supposed to be in the process of becoming nitrates. They have been taken, therefore, as indicating recent organic matter—the word "recent" meaning only that they stand between the organic matter and the nitrates. I do not know that nitrates are converted into nitrites in water. Still it may be found to be so.

It may be asked—If the nitrates are not a proof of albuminous matter, whence do they come? If it is said from the air, as Mulder would bring them, we need a proof; if from ancient remains, we need a proof; but we need no proof that they can come from albuminous substances. I believe they come from both animal and vegetable matter, so that decomposing roots and plants will send out some; but animal matter is the richest source. We have animal sewage and vegetable sewage. The latter is capable, as is well known, of doing much evil—perhaps not so much as the former, although this is uncertain. It does not seem proved that grass itself will not give nitrates. Yeast produces them. If vegetable and animal albumen are equally bad, we need not care as to the distinction of source; if nearly equal, we may care but little.

In looking for organic matter I think it quite unsafe to trust either to chemistry or the microscope, without giving time for the development of all possible germs; but this is a point which demands a good deal of inquiry. Microscopists have given us details of appearances, but these have not been sufficiently classed, and the conclusions drawn have, therefore, not been valuable to the desired extent. To trust to the microscope without time for development is to believe that the germs of disease can be seen. The use of allowing water to stand is not that the germs of disease may be seen, as we do not know them if we see them, but to see if the matter is active. The value of this must be tested.

The loss of the oxygen with peaty matter and no vegetation indicates, as already said, the formation of carbonic or a bitter acid. The loss of oxygen with the evolution of sulphuretted hydrogen indicates putrefaction; but there are two conditions which externally resemble each other very much—namely, the growth of vegetable matter with diminished oxygen, and the growth of vegetable matter with excess of oxygen. Water in the first of these conditions, too, may contain, as I imagine, the most dangerous ingredients. Germs of all diseases may exist in such waters; we do not know to what extent; and, as we are very ignorant on the subject, it is well to be alarmed at the conditions, until we have examined them and made distinctions.

We do not know very much about the second of the two, and if I think it less dangerous, it is, perhaps, more from a prejudice in favour of abundance of vital air, and of those hill waters which do not contain bitter peat, than from any accurate knowledge which has been attained.

(To be continued.)

Obituary.—Mr. F. C. Bakewell, the editor of the third and fourth editions of Clegg's "Treatise on the Manufacture of Coal Gas," died at his residence at Hampstead on Saturday evening, the 25th inst., in his 69th year, much regretted by all who had the pleasure of his acquaintance. Mr. Bakewell was the author of several popular works on scientific subjects, and for some years reported the meetings of scientific bodies for the daily press.

Average Composition and Quality of the Metropolitan Waters in August, 1869.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Comps.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction. . . .	19·47	0·071	0·091	0·000	13·8	3·9
West Middlesex . . .	17·17	0·041	0·078	0·000	13·8	3·3
Southwark and Vauxhall.	17·83	0·079	0·076	0·001	13·3	3·0
Chelsea	17·93	0·091	0·091	0·001	13·4	3·6
Lambeth	17·83	0·051	0·066	0·001	13·6	3·2
Other Companies.						
Kent	28·40	0·015	0·129	0·000	20·2	5·9
New River	17·83	0·028	0·076	0·000	13·3	3·4
East London.	16·03	0·035	0·091	0·000	13·2	3·1

Note.—The amount of oxygen required to oxidize the organic matter, nitrites &c., is determined by a standard solution of permanganate of potash acting for three hours; and, in the case of the metropolitan waters, the quantity of organic matter is about eight times the amount of oxygen required by it.

The quantity of water supplied to the metropolis daily by the several water companies was, according to the last returns to the Medical Officers of Health, 110,094,058 gallons. This was supplied to 466,969 houses, and it is at the daily rate of 34·7 gallons per head of the population. The quantity supplied to Paris, at the date of the last *Bulletin de Statistique Municipale*, was, for all purposes, ornamental and otherwise, only 23·6 gallons per head of the civil population.

Hy. Letheby, M.B.

Gas Explosion at Melville Hospital, Rochester.—During the time the workmen were repairing the gas-pipes at Melville Hospital, on Thursday, the 16th instant, an accident of a rather serious character occurred. The workmen had disconnected the pipes from the main, without, it would seem, first turning off the gas, the building soon becoming filled with gas. On a light being incautiously applied to test the joints, an explosion occurred, the effect of which was to lift the roof and shake the entire building, causing great alarm to the whole of the inmates.

North Cheshire Water Company.—At a meeting of the directors of this company, held on Thursday, the 9th inst., Mr. Henry Barratt, their superintendent, was appointed secretary, in place of the late Mr. R. W. Bennett.

Proposed Purchase of the Bangor Gas and Water Works by the Local Board.—Negotiations are in progress for the transfer of these works to the local board, and it was announced, at a recent meeting of the board, that a letter was received from Mr. White, the manager to the company, appointing a time and place for the directors and a deputation of the whole board to meet and arrange terms.

Sherborne Public Lighting.—At the last meeting of the Local Board of Health, a communication was read from the gas company, offering to supply 107 lamps, burning as heretofore, at 45s. per annum each; four lamps in the Bristol Road, at £3 5s. each; and seven lamps, burning all night, at £4 10s. each—the first item being a reduction of 2s. 6d. per lamp. After a long discussion, the board passed a resolution affirming that £2 per lamp was, in their opinion, sufficient for the 107 lamps, and £3 10s. each the proper price for the seven. A committee was also appointed to confer with the gas company.

Gas Lighting at Leamington.—If additional evidence were needed to prove how utterly the recent gas agitation failed in securing any advantages for the ratepayers of Leamington, it is to be met with in the constant bickerings which arise upon that question. The periodical homilies of the town surveyor with regard to the alleged savings of the double-tap system, and the special pleadings of the *Leamington Advertiser* on behalf of obvious extravagance and inefficiency, would be alike unnecessary were the benefits of a substantial character. To suppose that the intelligence of the ratepayers is so obtuse that they do not comprehend the blessings of cheap and efficient lighting is almost beyond the limit of human credulity. The truth is, the town is worse lighted under the new system than the old one, and the cost is considerably augmented. Hence it is that, to relieve themselves of the responsibility of the present disastrous state of the town with regard to the lighting of our streets, the authors of the gas agitation are always seeking, by a perversion of facts, to establish a victory where they sustained complete discomfiture. And these attempts naturally give rise to controversy, in the course of which it is always shown that the "saving" is fanciful, and the efficiency of the system a delusion. At a recent local board meeting, Mr. Barry, the town surveyor, reported that since the new system of lighting had been in practice the number of public lamps had been increased from 551 to 611, and yet there had been a saving of £714 8s. 1d. in the gas expenditure for nine quarters. If this report were correct, and could be relied upon, those who initiated the new system would be entitled to the gratitude of the ratepayers. We, however, must be excused from accepting the statement, because it is flatly disproved by the published accounts of the local board. In 1864-5-6, being the three years previous to the introduction of the new system, the total cost for gas was £4227 6s. 9d.; while in 1867-8-9, being the corresponding period after the new system was brought into use, the cost had gone up to £5430 9s. 3d. Mr. Barry says he can prove his statement to be correct. No doubt of it. Figures can be made to prove anything—by the rule-of-thumb; but the audited and certified accounts of the board show a saving over the "left shoulder." But supposing that Mr. Barry's statement be true, it by no means follows that the result is due to the double-tap or to the gas agitation. It is true that there are 611 lamps now against 551, the former number, but how many of these are lighted? Every one knows that night after night whole streets are kept in total darkness for several hours, whereas under the old system they were always well lighted. The two Parades, Bath Street, Victoria Terrace, Regent Street, Warwick Street, and other important thoroughfares are seldom lighted up now until the night is considerably advanced, and then the lighting is but partial. When complaints are made to the board, there is always some paltry excuse for this niggardly arrangement: it was a moonlight night, or else it ought to have been a moonlight night, and it was not their fault that the moon did not come out. If it was necessary to have abundance of light in former times, it is now much more so, when policemen have added thievery to drunkenness, and civilians go out as detectives to watch them. Evidently Mr. Barry's £714, if saved at all, has been effected by cutting short the gas supply, and this could have been done without an expensive parliamentary contest. There is no need to follow the subject farther, except to state that the local board ought to take steps at once to have the town properly lighted.—*Warwick and Leamington Times.*

The Gas Question at Redditch.—A meeting of gas consumers of this town was held at the Park Road Room, on Wednesday, Sept. 15, to receive and consider a proposal made by Mr. John E. Clift, the proprietor of the gas-works, with reference to the purchase of the undertaking, and the formation of a consumers company. Mr. Harrison occupied the chair, and opened the proceedings by referring to the several movements which had lately taken place in the town as to the future supply of gas, and expressing his opinion that the offer about to be made to the meeting was most liberal, and one that ought to be accepted. Mr. Clift said that, throughout the correspondence which had been held on the question, he had always borne in mind the possibility of the local board, or some other body, taking to the works and filling his place; and he had always said that, if the consumers were not satisfied with the present arrangements, that was the course they should adopt. At the last town meeting a proposition was submitted for the formation of a competing company, and he had been since informed that another company had been projected, with the design of purchasing his works. Under the advice of his friends, he had himself prepared a prospectus of a company with that object in view; but, having been so requested, he should ask the meeting to adjourn the consideration of it until after the next town meeting, when it was hoped such progress would be made in the negotiations as to obviate the necessity for this company. He then read the prospectus, and, in conclusion, stated that if neither of the plans was carried out, and the works should still remain in his hands, he should apply to Parliament for an Act to protect his property. After replies had been given to a number of questions respecting the proposed company, a resolution approving the scheme was adopted, and the further proceedings in the matter postponed. On the following evening the town meeting, adjourned from the previous Thursday, was held—Mr. Harrison in the chair. It was stated by Mr. Stinton that, in reply to the letter sent to Mr. Clift by direction of the last meeting, a letter had been received saying that he could not accede to the terms offered him. On receiving the reply, several members of the local board held a meeting to form a gas company, the prospectus of which would be read. The intention of those who originated the company was, that the price charged for gas should be 4s. 6d. to private consumers, and 4s. for the public lamps at first, which was 20 per cent. below the present rates. A great many shares had been taken, and if the consumers came forward and supported the scheme, it would prove highly successful. Mr. Lewis and Mr. Woodfield spoke in favour of the new company. Mr. Mogg said he was the first to bring the question of cheap gas before the local board, and he had worked at it ever since; but as the result of a canvass of the town for shareholders in the new company, he was disgusted with the want of support obtained. A bad company, badly managed, would be worse than going back to Mr. Clift. He had never considered that

a new company was necessary; all he wanted was to secure a proper price of gas for the town, and, in his opinion, the company proposed that night would not succeed. He thought the better course would be for the local board to purchase the works of Mr. Clift. They could borrow money at a moderate rate of interest, and if the works could be obtained for £10,000, the capital could be repaid in twelve or fourteen years. Mr. Lewis recommended the formation of the company for the purchase of the works, which company could resell them to the local board at any future time if the town desired it. He regarded the canvass for shares as very successful. The chairman said Mr. Clift would deal with this company if the money were provided for the purchase of his works. As to the other company, it consisted only of a few friends whom Mr. Clift had gathered round him for his own protection; but when the popular scheme was laid before him, he gave it every possible chance. After some further observations, a resolution in favour of supporting the plan now proposed was carried enthusiastically.

THE POLLUTION OF RIVERS.—The three commissioners—Major-General Sir W. Denison, Dr. Frankland, and Mr. J. C. Morton—appointed to inquire into the best means for remedying the pollution of rivers, have just commenced a personal inspection of the Aire and Calder. Two of the commissioners had an interview with the Sanitary Committee of the Town Council of Wakefield on Saturday, the 18th inst., and, from what Dr. Frankland said, it seems that the commissioners do not propose in this visit so much to take evidence as to see for themselves the manufactories and other works which cause the pollution of the rivers, and to ascertain, if possible, how such pollution may be prevented or removed. The commissioners have arranged to visit, in the course of their tour, Castleford, Dewsbury, Batley, Huddersfield, Halifax, Leeds, Bradford, Keighley, Todmorden, and Skipton.

EAST LONDON WATER-WORKS COMPANY.—The half-yearly meeting of this company will be held on the 7th of October. An extraordinary meeting is also convened for the same day, to authorize the directors to raise additional capital for the completion of the new works now in progress.

THE ASHFORD WATER SUPPLY.—The question of the water supply in Ashford seems likely to assume a fresh phase. At the beginning of this month, Mr. Homersham, the engineer of the new Canterbury Water-Works, visited Ashford on business connected with the winding up of the old Ashford Water Company, the plant of which will shortly pass into the possession of the proprietors of the Ashford Water-Mill. Mr. Homersham, it seems, intimated that the Canterbury Water Company would be inclined, if the project was received favourably in Ashford, to bring a main from Canterbury to Ashford, and charge the service-pipes in that town with water from the Canterbury Water-Works. The length of main required would be upwards of 13 miles, and the cost about £600 per mile. The altitude of the Canterbury reservoir is 230 feet above the level of the sea, while the highest ground at Barrow Hill, Ashford, is not more than 200 feet above the level of the sea, so that there would be pressure to supply every house in the town. The Canterbury Company would lay down the main from their works at their own expense, and probably charge about 6d. for every 1000 gallons consumed. The retailers of water in Ashford—whether the local board or a public company—would then make such a charge to customers as would prove remunerative. Of course, the Canterbury Company would require a lease for a term of years, and a certain quantity of water to be taken. The subject was mentioned at the termination of the Ashford Local Board meeting on Wednesday, the 8th inst., and a considerable amount of conversation took place upon it. Several members started objections to the scheme, while others approved of it rather warmly, and pointed out that it would not involve any outlay on the part of Ashford.

Register of New Patents.

3541.—CLINTON EDGCUMBE BROOMAN, of the firm of Robertson, Brooman, and Co., of 166, Fleet Street, in the City of London, patent agents, for "*Improvements in the manufacture of gas for lighting and heating, and in apparatus employed therein.*" A communication. Patent dated Nov. 21, 1868.

This invention relates to the production of gas for lighting and heating purposes by the carburation of atmospheric air. The characteristic features of the invention are the following:—

1. The apparatus is combined with a motor, which obtains its power from a portion of the gas produced, and which directly feeds the carburator or hydrocarbon reservoir with the atmospheric air necessary for the generation of the gaseous vapour.

2. The motor allows of establishing a circulation of water in a jacket or casing around the carburator, for the purpose of absorbing the cold resulting from the evaporation of the essence or hydrocarbon. The cooled water is sent into the motor, in which it is reheated by serving for the condensation, and it returns into the jacket, restoring the lost heat to the essence, so that the essence being constantly reheated by the water in proportion as it is cooled, there is no interruption or diminution in the production of the gas.

3. The air is drawn by bellows worked by the motor heated in an annular space surrounding the motor, and then sent into regulating bellows, in which it accumulates under a nearly constant pressure.

4. The air becomes saturated with carburated vapours in traversing a series of layers of flannel and wood shavings and sawdust, which are soaked with the essence by capillary attraction, and which, besides, is always damped therewith by means of a pneumatic injector worked by the motor. The saturated air rises through a series of alternate layers of flannel, wood shavings, and iron filings, which deprive it of the excess of vapours and non-volatilized globules; it afterwards issues in a suitable degree of saturation by a pipe, from which it is distributed for consumption.

3562.—THOMAS SMITH, M.D., of Portland House, Cheltenham, and JOHN VAN NORDEN BAZALGETTE, of the Langham Hotel, Portland Place, in the co. of Middlesex, for "*Improvements in deodorizing and manufacturing manures from sewage and other foul waters, and in apparatus employed therein.*" Patent dated Nov. 23, 1868.

In carrying out this invention the sewage or other fluid is introduced into the settling-tank through openings in the wall of the tank at different heights, so as to obviate the disturbance caused in the process of precipitating the solid matter by the falling of the sewage stream from the upper surface of the tank wall; also communicating a slow horizontal rotary movement to the fluid at the level of its entry into the tank. A horizontal rotary motion may also be given by an open circular duct or ducts, constructed in the interior walls of the tanks delivering the sewage or other fluid at the level in the tank, and communicating a slow horizontal motion to the fluid at or near its surface. The form of the bottom of the tanks may be varied to suit the shape of the tank, whether square, round, oval, or otherwise. The bottom of the tank being low on one side, or on both sides, with a ridge in the centre, or rising from all the sides to the centre, in a conical or pyramidal form, or sinking from the sides to the centre in a conical or pyramidal form, for the purpose of collecting the deposit or residuum from the sewage on one or both sides, or at the four corners, or at the centre of the tanks. The deposit at the bottom of the tanks is drawn off by conduit pipe or pipes, fitted with valves or traps, or similar apparatus, for opening and closing the pipes. These draw off the sewage deposit from the bottom of the tanks into the drying-bed or other receptacle provided for receiving it. Chain buckets or elevators are used when necessary to raise the fluid sewage deposit into the drying-beds. In cases where the hydraulic pressure in the tanks does not raise the fluid deposit to a sufficient elevation, filters are employed, having beds, on to which the liquid is admitted, and over them are layers of gravel, sand, and charcoal, up through which the liquid forces its way, and so is filtered; or peat may be used as the filtering material.

3581.—GEORGE BERNHARDT, of the firm of John C. Milns and Co., Radcliffe, in the co. of Lancaster, spinners and manufacturers, for "*Improvements in arrangements and apparatus for regulating and economizing the supply of gas in mills and manufactories.*" Patent dated Nov. 25, 1868.

In mills and manufactories the gaslights only require to be "turned on" fully while the driving power is at work, therefore the lights may be turned down before the driving power begins and immediately after it ceases to work, and thus a saving of gas may be effected, and, besides this, accidents by fire arising from lighting or turning off the gaslights separately while under the full pressure are prevented.

The object of this invention is to regulate the gas, as above explained, by self-acting means, and it consists in arrangements and apparatus which will open a valve or tap to turn on the full pressure and supply of gas when the driving power is set to work, and to shut the valve or tap, or turn off the full pressure and supply of gas, when the driving power ceases to work.

The invention may be carried into effect by various arrangements, but that which is preferred is an ordinary ball governor driven by or geared with some convenient shaft; the action of the governor, when it rotates, opens the valve, and when it ceases to rotate it closes the valve, which (if a lifting valve) is connected with the governor through an ordinary water or mercury "sealed" slide. The minimum supply of gas to allow of small lights before the driving power begins and after it ceases may be allowed to pass through a small hole adjusted by a screw plug or through a small tap. Instead of an ordinary governor another arrangement may be employed. The gas-valve may be connected with a vertical spindle, which has a tube upon it having screw wings, and this tube, combined with another tube or cylinder, and with mercury or water or other suitable liquid, is arranged to act as a "seal" to prevent the escape of gas, while allowing the spindle and the tube carried by it to rotate. When the spindle is rotated the screw wings upon the tube act upon the mercury or liquid used as the "seal," and this causes the spindle to lift and open the gas-valve at the same time, and when the spindle ceases to rotate the weight of the valve and connected parts causes it to sink and close the valve.

3599.—LOUIS ROMAN, of Paris, France, hydraulic engineer, for "*An hydraulic motive power.*" Provisional protection only obtained. Dated Nov. 26, 1868.

This invention consists in two endless chains formed of bars of flat iron, with articulated joints and curved paddles fixed on these bars. These paddles are kept perpendicular and parallel to each other, at suitable distances apart, so as to form an endless chain of paddles, which chain is laid over two or more drums, pulleys, or wheels, the axes of which are situate parallel to the level of the water, and revolve in vertical standards provided in boats or other suitable moveable or fixed supports; the said endless chain is laid in the direction of the current, and kept at such height that the paddles of the lower portion of the chain are immersed perpendicularly in the water, whilst the remainder of them are out of this latter.

3671.—THEODORE BYRON HUBBELL, of Euston Square, in the co of Middlesex, manufacturer, for "*An improved reflector for oil and other lamps and burners.*" A communication. Provisional protection only obtained. Dated Dec. 2, 1868.

This invention consists in a metal shield or reflector, made bright on its under side, and pierced at the centre to allow of the flame of the lamp passing up through it. It is fitted to the Argand or other burner, and, by means of a pinion in gear with a rack connected with the reflector, it is made capable of vertical adjustment relatively to the lamp-flame.

3694.—MATTHEW PIERS WATT BOULTON, of Tew Park, in the co. of Oxford, gentleman, and JOHN IMRAY, of Westminster Bridge Road, in the co. of Surrey, engineer, for "*Improvements in rotary propellers, pumps, and fans.*" Patent dated Dec. 4, 1868.

This invention relates in part to rotary apparatus for pumping or forcing liquids or æriform fluids. One form of propeller employed is constructed as follows:—The inventors mount a wheel on an axis transverse to the length of the vessel. This wheel consists of a central disc or cylindrical core, furnished with blades projecting from it, and works freely within a cylindrical casing. On either side of the wheel are guiding passages, two sides or boundaries of which are portions of cylinders, the outer one being a continuation of the cylindrical casing in which the wheel works, while the inner one is of the same diameter as the disc or cylindrical core of the wheel. Each of these guiding passages is open on one side to the blades of the wheel, so as to afford a free passage for the water to them, and is bounded on the opposite side by a helical surface. The positions of the helical guides and the width of the space between them in which the wheel works are so adjusted that if one of the helices were prolonged with a uniform curvature, it would join the other and form a continuous screw-thread throughout. The guiding passages thus formed are united tangentially with passages directed fore and aft respectively, which open into the outer water as directly or conveniently as possible.

3697.—FREDERICK BEECH, of Salford, in the co. of Lancaster, estate agent, for "*Improvements in gullies or stench-traps, and in mud-boxes connected therewith.*" Patent dated Dec. 4, 1868.

This invention consists in an arrangement of gully or stench-trap and mud-box, which may be cleaned without breaking up the street, and by which the mud and other solid matter is to a great extent prevented from passing into the trap. The mud-box, with which is cast a second vessel, contains the mid-feather, which constitutes the ordinary trap, and within which the inventor places a grid. Upon a continuation of the mid-feather is cast a lug, to which is hinged a dead plate formed in the same piece

with the usual grid, and the plate rests at its inward end upon a midfeather extending across the box, thereby forming a trap which is provided with a grid.

3714.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*A new or improved chemical compound for the disinfection and treatment of sewage and other liquid and solid matters.*" A communication. Patent dated Dec. 5, 1868.

This invention relates to the manufacture of double phosphate of magnesia and iron, and also to the application of the same for the treatment of sewage waters and other similar matters, and for disinfecting and enriching the residuum of said waters or matters.

3715.—ARISTIDE BALTHAZARD BÉRARD, of Avenue Montaigne, Paris, in the empire of France, civil engineer, for "*Improvements in the processes and apparatus for manufacturing, collecting, and purifying gas for heating and other purposes.*" Patent dated Dec. 7, 1868.

This invention consists in improvements in processes and apparatus for forming a mixture of gas suitable for the production of heat or light, or of heat and light, the principle of and essential arrangement of apparatus for which are described in the specification of letters patent granted to the present patentee, and dated Sept. 20, 1866 (No. 2415).

The apparatus employed for the production of gases, or gas generator, consists of a kind of small blast-furnace supported on columns, and the crucible of which is moveable. The external casing is made of sheet or cast iron, and the inner lining of refractory materials. The coal, wood, turf, or other suitable fuel employed is introduced through the upper opening, provided with an hydraulic bell or cover, into a tube, widening out into a conical form at its lower part. This part is perforated with holes to facilitate the escape of gases. This tube rises or falls, so as to regulate the height of the charge in the receiver of the gas generator, which is supposed to be full of fuel. The shape of the interior of the gas generator is that of two cones, with their bases opposite each other, attached together by a cylindrical part. This arrangement has the advantage, when employing rich coals which expand, of facilitating the descent of the charge into the upper part of the receiver, in which the coal has not been converted into coke by the volatilization or the decomposition of the tarry substances. The bottom of the furnace is moveable, and consists of a sheet or cast iron basin lined internally with refractory materials. It is so constructed as to allow the cinders of the fuel, rendered liquid by an addition of lime, or basic scoriæ, to run off through a hole. This basin is mounted on wheels, so as to permit of being removed and replaced rapidly by another. The joint of the moveable basin is rendered air-tight by means of a channel on its circumference filled with earth, and in which a projecting part enters. A mechanical arrangement allows the raising and lowering of this moveable sole plate. Openings are made in the circumference of the casing of the gas generator for setting up a temporary grate for suspending the charges, in case of repairs being made to the lower part, or during the changing of the moveable sole plate when at work. The air is injected into the gas generator at its lower part by means of five tuyères; this number may be varied. Carbonic acid is first formed, which is soon converted into oxide of carbon by passing through the upper beds. When the temperature is at its maximum in the gas generator, superheated steam is injected through the tuyères, and others placed above the air tuyères, and which is decomposed by contact with the incandescent coke. The steam is converted into oxide of carbon and hydrogen, which unite with the carburetted hydrogen contained in the coal, and with the oxide of carbon produced by the action of the oxygen of the air injected on the fuel in the gas generator. The steam is superheated by its passage in the pipes sunk in the brickwork of the gas generator, or by other suitable means. When required to increase the proportion of bicarburet of hydrogen, a stream of pitch, or other carburet of hydrogen, can be drawn from several receivers placed above each tuyère, and injected into the gas generator through the mouth of the corresponding steam tuyère. By this means a lighting property is obtained, as well as the calorific and carburetting properties of the gas. The gases thus produced meet with a rather great resistance in passing through the column of materials enclosed in the charging-tube, so that there is no appreciable loss when another charge is introduced, and in the interval between the charges the hydraulic cover prevents any loss. The introduction of fuel into the receiver is continuous by reason of the continual charge placed above it in the pipe, and the production of gas by the distillation of the coal or other fuel is thus regulated. The gases run off through the egress orifice into a general conduct-pipe, which may be common to several gas generators. A valve may, if required, be used to shut off communication between the gas generator and the general pipe. By this arrangement of mechanism the gas egressing under pressure may be conducted wherever its employment is required. It may be used for industrial and domestic purposes, and may also be utilized for lighting or as a means for producing power.

3724.—CLAUDE FRANÇOIS CONSTANT CRETIN and JAMES WATSON, both of Glasgow, in the co. of Lanark, N.B., for "*Improvements in supplying air to divers, and lamps for burning gases and oils.*" Patent dated Dec. 7, 1868.

These improvements consist in drawing off or exhausting the foul air and gases, thereby allowing fresh air to flow down the supply-pipes by gravitation, instead of forcing down the fresh air, as heretofore practised. This is effected by means of a fan or exhauster, which may be driven by a system of wheelwork actuated by springs or by any other convenient method. The fan box or casing is connected to the tube or tubes which communicate with the diver's helmet and lamp, through which the foul air and products of combustion are drawn off and discharged into the atmosphere, thus producing a partial vacuum within the helmet and lamp, which may be supplied with fresh air by means of one main air-tube provided with two branches at one end, one of which is attached to the diver's helmet, and the other branch to the lamp.

APPLICATIONS FOR LETTERS PATENT.

2685.—WILLIAM EDWARD NEWTON, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*An improvement in pumps.*" A communication. Sept. 14, 1869.

2719.—NICHOLAS JOSEPH DOR, of Ampsin, province of Liège, Belgium, for "*A new method for manufacturing crucibles, muffles, gas-retorts, &c., through the agency of hydraulic presses.*" Sept. 18, 1869.

2731.—ALFRED TYLOR, of Newgate Street, in the City of London, brass-founder, for "*Improvements in water-taps and cistern apparatus for preventing the waste of water and for cleanliness.*" Sept. 20, 1869.

2739.—HENRY COCKEY and FRANCIS CHRISTOPHER COCKEY, of Frome Selwood, in the co. of Somerset, for "*Improvements in apparatus for scurfing retorts.*" Sept. 21, 1869.

2748.—MALCOLM MACLEOD, of Manchester, in the co. of Lancaster, engineer, for "*Improvements in apparatus for sanitary purposes.* Sept. 22, 1869.

2751.—ENOCH HILL, of Longton, in the co. of Stafford, engineer, for "*Improvements in slide-valves.*" Sept. 22, 1869.

2752.—ROBERT RENTON GIBBS, of Liverpool, in the co. of Lancaster, engineer, for "*Improvements in pumps, vacuum-pumps, and blast-engines, and in lubricators for the same, which are also applicable to other lubricating purposes.*" Sept. 22, 1869.

2754.—JOHN TARBUCK and THOMAS BURNS, of Abram, near Wigan, in the co. of Lancaster, for "*Improvements in the method of pumping water from shafts, pits, or similar places, which method is also applicable for drawing gas from goaves in mines, and for ventilating pits or shafts in course of sinking.*" Sept. 22, 1869.

2763.—ROBERT CRAWFORD WALLACE and DAVID CRAWFORD, of the firm of Wallace and Crawford, engineers and ship chandlers, of Ardrossan, in

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Price per Share.
	£		£ s. d.	£ s. d.	£
8000	10	Anglo-Romano	10 0 0	10 0 0	11 — 12
5000	20	Bahia (Limited)	20 0 0	3 0 0	10 — ..
1000	20	Do., preference	20 0 0	10 0 0	24 — 25
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	4 10 0	4¾— 4¾
10000	5	Do., third issue	4 0 0	4 10 0	4 — ..
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge, & Holywell.)	20 0 0	10 0 0	30 — 31
12000	50	*Chartered*	50 0 0	4 5 0	46 — 46½
6080	50	Do.	45 0 0	4 5 0	41 — 41½
10000	20	*City of London*, A shares	20 0 0	9 0 0	23 — 24
10000	10	Do., B shares	10 0 0	4 0 0	6¾— 7
9629	10	Do., new shares	10 0 0	9 0 0	11 — 12
17490	25	*Commercial*	25 0 0	10 0 0	35 — 36
20000	20	Continental Union	20 0 0	5 0 0	24 — 25
10000	10	Do., new	2 10 0	..	4 — 4¼
5213	20	Do., preference	20 0 0	7 0 0	23 — 24
5000	10	*Crystal Palace District*	10 0 0	10 0 0	13½— 14
5000	10	Do., preference	10 0 0	6 0 0	12½— 13
10000	10	Do., new shares	10 0 0	7 0 0	10½— 11
4000	50	*Equitable*	50 0 0	10 0 0	68 — ..
4000	25	Do., new shares	25 0 0	10 0 0	32½— 33
23406	10	European (Limited)	10 0 0	11 0 0	15 — 15¾
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	7½— 7¾
20000	10	*Great Central Gas Consumers*	10 0 0	..	12 — 12½
5000	10	Hong Kong (Limited)	10 0 0	6 0 0	8 — 10
26000	50	*Imperial*	50 0 0	10 0 0	77 — 78
26000	10	Do., new shares	4 0 0	10 0 0	6¾— 7
26000	12½	Do., new shares	12 10 0	7 0 0	13 — 14
1300	100	Do., bonds	£100	10 0 0	175 —180
23000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	16 0 0	114½—115

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Price per Share.
	£		£ s. d.	£ s. d.	£
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	51 — 53
3000	10	Do.	10 0 0	5 0 0	7 — 8
3000	20	Do.	15 0 0	7 10 0	15 — 16
7133	50	*London*	50 0 0	10 0 0	71 — ..
5610	25	Do., 1st preference	25 0 0	6 0 0	26 — 28
503	50	Do., 2nd preference	50 0 0	6 0 0	
214	50	Do., 3rd preference	50 0 0	6 0 0	
£18781		Do., 1st preference stock		6 0 0	
£11828		Do., 2nd preference stock		5 0 0	
		Nictheroy, Brazil (Limited)			
15000	5	Malta and Mediterranean (Limited)	5 0 0	3 10 0	3¾— 4
6000	5	Do., preference	5 0 0	7 0 0	4¾— 5¼
30000	5	Oriental (Calcutta)	5 0 0	10 0 0	7¾— 8
30000	5	Do., new shares	1 0 0	10 0 0	1¾— 1¾
10000	5	Ottoman (Limited)	5 0 0	nil.	1¾— 2¼
12500	10	Pará (Limited)	10 0 0	7 10 0	8¾— 9
27000	20	*Phœnix*	20 0 0	10 0 0	27¾— ..
3600	100	Do., new	35 0 0	7 10 0	36 — 36½
144000	8k.	Do.	100 0 0	5 0 0	73¼— 74¼
5000	20	*Ratcliff*	20 0 0	10 0 0	23 — 24
	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	24¼— 24½
6959	5	Singapore (Limited)	5 0 0	4 0 0	
2000	5	Do., preference	5 0 0	7 10 0	
		Shanghai			
4800	50	*South Metropolitan*	50 0 0	10 0 0	73 — 75
4800	12½	Do., new shares	12 10 0	10 0 0	18¾— 19
15000	10	*Surrey Consumers*	10 0 0	10 0 0	13¾— 13¾
10000	10	Do., new	6 0 0	10 0 0	8¾— 9
9000	4	United General (Limerick)	4 0 0	5 0 0	2 — 2¼
10000	10	*Victoria Docks*	5 0 0	6 0 0	
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	10 — 12
1500	10	Do.	10 0 0	7 10 0	
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
20000	10	Western (Limited) A shares	10 0 0	10 0 0	14½— 15
10000	10	Do., B shares	7 0 0	10 0 0	9¾— 10
10000	10	Do., C shares	7 0 0	10 0 0	9¾— 10
20000	10	Do., D shares	1 0 0	10 0 0	1¾— 2
8000	5	*West Ham*	7 0 0	7 10 0	7⅛— 7¼
6000	5	Do., new shares	7 0 0	7 10 0	
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

the co. of Ayr, N.B., for "*Improvements in pumps and mechanism connected therewith, applicable to ships and other purposes.*" Sept. 23, 1869.

GRANTS OF PROVISIONAL PROTECTION.

2580.—THOMAS WILSON, of Birmingham, in the co. of Warwick, gun manufacturer, for "*Improvements in screw and ratchet wrenches, part of which improvements is also applicable to pipe-cutters.*" Sept. 1, 1869.

2587.—BERNARD ISANGK, of 3, Ile Lacroix, in the city of Rouen, in the empire of France, civil engineer, for "*Improvements in apparatus for indicating and registering the pressure of steam or other gases or liquids.*" Sept. 1, 1869.

2648.—JAN ANTHONY MULLER, of Amsterdam, in the kingdom of Holland, at present of 123, Chancery Lane, in the co. of Middlesex, for "*Improvements in apparatus for measuring and registering the flow of water and other liquids, part of which improvements is applicable to measuring and registering the flow of gases.*" Sept. 8, 1869.

NOTICES TO PROCEED.

1401.—ERNEST SEYD, of Princes Street, in the City of London, for "*Improvements in fluid-meters.*" A communication. May 7, 1869.

1405.—JOHN RAMSBOTTOM, of Leeds, in the co. of York, hydraulic engineer, and THOMAS MASSEY PEARCE, of Bradford, in the co. aforesaid, wool merchant, for "*Improvements in steam and hydraulic apparatus for pumping, forcing, and measuring water, and for raising weights.*" May 7, 1869.

1457.—JOHN LOWE GREATOREX, of East Grinstead, in the co. of Sussex, plumber, for "*Improvements in urinals.*" May 12, 1869.

1471.—JOHN FAWCETT, of Huddersfield, in the co. of York, tin-plate worker, for "*Improved means or apparatus for measuring oil or other liquids.*" May 13, 1869.

1493.—LOUIS ANTOINE VICTOR DUBOURG, of Leicester Street, Leicester Square, in the co. of Middlesex, doctor of medicine, for "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" May 15, 1869.

1656.—ABRAHAM HEMINGWAY, of the city of Manchester, in the co. of Lancaster, engineer, for "*Improvements in slide-valves.*" May 29, 1869.

2276.—THOMAS PARSONS, of the state of Massachusetts, U.S.A., for "*A new and useful mechanism, apparatus, or engine to be used either in measuring water discharged from a conduit, or for various other useful purposes.*" A communication. July 27, 1869.

2582.—JAMES SHAND, of 75, Upper Ground Street, Blackfriars, in the co. of Surrey, for "*Improvements in direct-acting steam pumping-engines and steam fire-engines.*" Sept. 1, 1869.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2315.—FREDERICK WARNER, WILLIAM STEWART, and GEORGE WILLIAM BARBER, "*Improvements in water-closets, and in valves and regulating apparatus for the same and other purposes.*" Sept. 8, 1866.

2333.—ROBERT ANTHONY HARDCASTLE, "*Improvements in apparatus for measuring and indicating the quantity of liquid drawn off thereby.*" Sept. 11, 1866.

2395.—THOMAS PARKES, "*Improvements in tube-cutters.*" Sept. 18, 1866.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

in.	2 in.	2½ in.	3 in	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordshire.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	3 15 0	2 13 3	2 8 6	3 10 0	3 10 0
1½ and 2-inch Socket-pipes	7 0 0	5 15 0	5 10 0	6 0 0	7 0 0
2½ and 3-inch ditto	6 10 0	5 5 0	5 0 0	5 15 0	6 10 0
4 and 5-inch ditto	6 0 0	4 15 0	4 10 0	5 5 0	6 0 0
6 inches and upwards ditto	5 15 0	4 5 0	4 0 0	5 0 0	5 15 0
Retorts, 1st fusion, hot blast	5 10 0	4 10 0	4 5 0	5 0 0	5 10 0
Ditto, 2nd ditto, cold ditto	6 10 0	—	—	—	6 10 0
Tank-plates, ¼ thick and above	6 0 0	5 0 0	4 15 0	5 10 0	6 0 0

WROUGHT-IRON TUBING,

Subject to 50 per cent. Discount.

	2 in.	1¼ in.	1½ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 14 feet—per foot	1 6	1 1	0 10	0 7	0 5	0 4½
Ditto ditto, from 12 in. to 23½ in.—each	3 0	2 0	1 6	1 1	0 9	0 8
Long Screws, from 12 in. upwards	4 0	2 3	2 0	1 6	1 2	0 11
Bends and Springs	4 3	2 3	1 9	1 3	0 11	0 8
Square Elbows, equal or reducing; Round Elbows, 5 per cent. extra	3 9	2 3	1 9	1 3	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 9
Crosses, ditto, equal or reducing	4 9	3 6	3 0	2 3	1 9	1 6
Iron Cocks	20 9	13 0	10 0	7 3	5 0	3 8
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4½
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2-quart	15 0	14 0	13 6	13 0	12 0	—

GAS COALS.—*Per Ton.*

	s. d.
Newcastle.—Unscreened:—	
Haswells, Nettlesworth Primrose, and South Pelaw	6 6
Felling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	6 9
Burnhope, Craghead, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 0
Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Peareth, Stella, Urpeth, Washington Hutton, and West Leverson	7 6
Ramsay's Newcastle Cannel	15 0
Wigan Cannel (at Liverpool)	17 0
Scotch Cannel:—	
Boghead—at Bo'ness, 47s. 6d.; at Leith	48 2
Muirkirk	27 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	28 6
Ditto, 2nd ditto (at ditto)	19 6
Cowdenbeath	12 0
Lesmahago (at Glasgow)	21 6
Ditto (at Granton)	33 6
Arniston	27 6
Wemyss, f.o.b.	22 6
Haywood, Wilsontown (at Granton)	33 0
Pirnie, or Methill	17 0
Lothian's Cannel (f.o.b. at Leith)	26 0
Bo'ness Cannel (at Bo'ness)	19 0
Myles' Cannel	23 6
Lochore Parrot (at Burntisland)	28 0
Lanemark (at Glasgow)	16 0
Elphinstone Tower (at Leith)	20 0
Coppa Cannel (on railsat Birkenhd.)	14 9
Ditto ditto (ditto at Connah's Quay)	14 3

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—	s. d.
Chatham and Rochester	5 6
Cork	8 0
Dover, Folkestone, and Ramsgate	6 0
Dublin	9 0
Exeter Quay	8 6
Ipswich	4 6
London (from Leith)	8 6
London (Pool)	5 6
Lowestoft and Yarmouth	4 6
Portsmouth and Southampton	7 0
Plymouth	7 6
Shoreham	6 6
Whitstable	5 6
Weymouth	7 6
Foreign.—Per Keel:—	£ s.
Barcelona	10 0
Bordeaux	11 10
Boulogne and Calais	8 10
Cadiz	12 10
Cronstadt	24 6
Copenhagen	9 0
Genoa	13 0
Hamburg	7 10
Havre de Grace	8 0
Leghorn	18 15
Lisbon	12 10
Rotterdam	7 0
Stettin	9 10
Trieste	16 0
Venice	20 0

SUNDRIES.

	£ s. d.
Best Newcastle Fire-bricks, per 1000	£2 10s. to 2 15 0
Cliff's Fire bricks (at Wortley), per 1000	2 15 0
Ingham's do. (at Wortley), p. 1000	2 15 0
Farnley Iron Co.'s Fire-bricks (at Wortley), less discount	2 17 0
Fire-clay Retorts, p. ft. run...6s. 6d. to	0 7 6
Tough Cake Copper, per ton	72 0 0
English Pig Lead, per ton	19 0 0
Welsh Bar Iron (in London), p. ton	6 15 0
Foreign Spelter, per ton	20 12 6
English Block Tin, per ton	123 0 0
Banca, per ton	135 0 0
Tarred Rope Yarn, p. cwt.	1 0 0

Advertisements.

TRAVELLER Wanted, by R. Laidlaw and Son, for their London establishment, thoroughly qualified to represent the firm in the various branches of their business as Gas Engineers, Contractors, Iron and Brass Founders, Gas-Meter Manufacturers, &c.

Apply, with testimonials and references, at Southwark Street, Borough, LONDON, S.E.

GAS-making Apparatus to be Disposed of, in good working condition, large enough to supply 600 lights.

Apply at 3, Marsden Square, MANCHESTER.

BUENOS AYRES GAS COMPANY.

The Agency for the above Company has been REMOVED from Weaver Buildings, 15, Brunswick Street, to ST. GEORGE'S CHAMBERS, 4, CABLE STREET, LIVERPOOL.

Sept. 16, 1869. LOUIS WILDE, Agent.

FOR SALE, a cast-iron Tank (equal to new) and a single-lift GASHOLDER, 22,000 cubic feet capacity, with 6 cast-iron guide-columns complete.

For price and particulars, inquire of Mr. E. GODDARD, Gas-Works, IPSWICH.

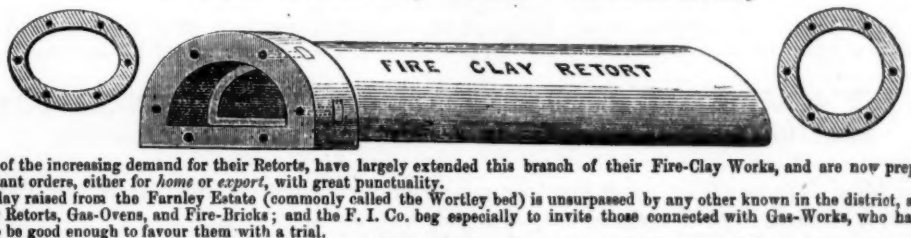
TO GAS ENGINEERS & CONSTRUCTORS OF SMALL GAS-WORKS.

FOR SALE, Two Condenser Boxes for 3-in. pipes complete; Two 7-ft. lengths of 14-in. D Hydraulic Main; One length Circular ditto, Dip-Pipes, and H-Pipes; One Washer; Two Circular Purifiers, 4 ft. by 2 ft.; One Square ditto, 3 ft. by 2 ft. by 2 ft.; and a quantity of Sight Plugs, Bends, &c. All as good as new. Only been in use two years. Also Two Furnace Frames and Doors, and Two 3-in. Syphons, new.

For particulars, apply to JOHN STREECHER, Gas Engineer, READING.

THE FARNLEY IRON COMPANY,

FARNLEY, near LEEDS,



In consequence of the increasing demand for their Retorts, have largely extended this branch of their Fire-Clay Works, and are now prepared to execute the most important orders, either for *home* or *export*, with great punctuality.

The Fire-Clay raised from the Farnley Estate (commonly called the Wortley bed) is unsurpassed by any other known in the district, and is peculiarly well adapted for Retorts, Gas-Ovens, and Fire-Bricks; and the F. I. Co. beg especially to invite those connected with Gas-Works, who have not yet used their Retorts, to be good enough to favour them with a trial.

The F. I. Co. generally hold in stock, for immediate supply, Fire-Bricks of every size and kind—Tiles, Sanitary Tubes, Ornamental Terra-Cotta Ware White Facing Bricks, the White, Buff and Salt-Glazed Bricks, &c., &c.

Prices, Drawings, and all other information may be obtained by applying as above, or to

MR. SUTTON, THE HULL STORES, 46½, QUEEN STREET, HULL.

PATENT DRY GAS-METERS,

MANUFACTURED BY

D. BRUCE PEEBLES,

ENGINEER & GAS-METER MANUFACTURER,

FOUNTAINBRIDGE WORKS, EDINBURGH.

D. BRUCE PEEBLES having commenced a new manufacture in DRY GAS-METERS, begs to call the attention of Gas Engineers to its special advantages.

The meter-case is made of strong tinned sheet iron, which will withstand oxidation even in damp places for a very long time, and is not liable to be broken by a blow or fall, while the weight is not one-third of those in cast iron.

The construction of this meter is so simple that a few screws only are required for fitting, and it can be taken to pieces and refitted with a facility hitherto unattainable.

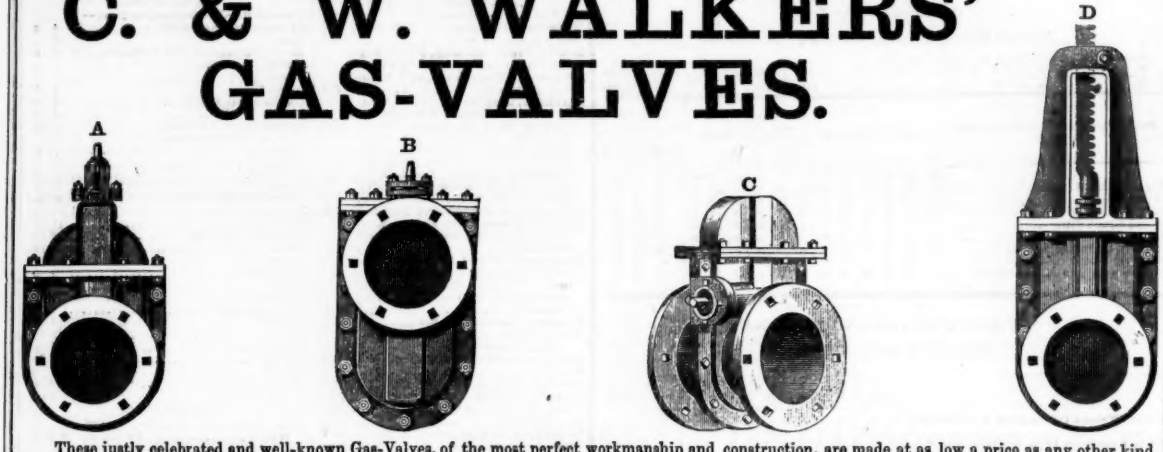
The jointing is novel, simple, and effectual, and is made with a minimum of cement or putty.

The whole of the working parts can be got at in a few minutes, without a soldering bolt, and can be cleaned, refitted, and set to work without the resetting of valves and levers—an operation found to be very troublesome with ordinary dry meters, and only practicable to an experienced workman. With this meter any one who can handle a screw-driver may take to pieces, clean, and refit the whole with the greatest ease.

D. B. P., while thanking the many friends and customers who now have his wet meters in use, begs to state that the same care and attention to the quality of workmanship and materials which are given to that branch will be extended to the dry meter manufacture, and he trusts by constant personal attention to merit a continuance of that patronage which already has been so liberally bestowed.

***** The 3-Light Dry Meters are now ready for delivery, and other sizes are being proceeded with as rapidly as possible.**

C. & W. WALKERS' GAS-VALVES.



These justly celebrated and well-known Gas-Valves, of the most perfect workmanship and construction, are made at as low a price as any other kind. A—Above-ground Screw Gas-Valve, with improved indicator to show when open and shut, is the best Valve for Purifiers where the most perfect tightness is required, and for heavy pressure generally. B—Under-ground Screw Gas-Valve. C—Internal Rack Gas-Valve, with pinions of homogeneous metal. D—Ordinary Rack and Pinion Valve, with strong undamageable racks and pinions.

MIDLAND IRON-WORKS, DONNINGTON, NEAR NEWPORT, SHROPSHIRE,
AND 8, FINSBURY CIRCUS, LONDON, E.C.

C. A. S. VICKARY,

(ADMINISTRATRIX TO THE LATE JOHN VICKARY,)

GAS ENGINEER AND CONTRACTOR, IRON AND BRASS FOUNDER,

EXE ISLAND, EXETER,

Tenders her best thanks to the various Gas Companies in **England, Ireland, and Wales,** for the very liberal and kind support received by her lamented husband for the last **22 years,** during which period he erected and extended more than **200 Gas-Works.** She respectfully solicits a continuation of that support, and begs reference to the following testimonial:—

Plymouth and Stonehouse Gaslight Company.

Sir,—I have much pleasure in testifying that the 100-foot Telescope Gasholder and Cast-Iron Tank, erected by you for this Company in 1862, has given the highest satisfaction, and never required the slightest alteration or adjustment since its completion.

Mr. John Vickary. (Signed) PETER ADAMS, Chairman.

The late Mr. Vickary also erected a 100-foot Gasholder and Cast-Iron Tank at **Exeter;** an 80-foot Telescope Gasholder and Iron Tank at **Devonport;** a 90-foot at **Torquay,** &c., &c. At either of these works satisfactory references can be made.

C. A. S. V. begs particular attention to her **Improved Gas-Meters,** both **Wet and Dry,** the materials and workmanship of which are guaranteed of the very best description, and which have gained for her Meters so excellent a reputation.

RETORTS, DIP & ASCENSION PIPES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, and GASHOLDERS,

Of any size, and every description of article required in Gas-Works supplied.

Mains, Tees, Connexions, and Syphons, from 2 to 12 in., always in stock, and supplied at Scotch prices.
Clay Retorts and Fire-Goods of every description.
Chandeliers and Gas-Fittings of the most modern designs.
Iron Pipe and Fittings, Service Cocks, &c.

Plans, Specifications, and Estimates for the Erection of New Gas-Works of any size furnished.

INTERNATIONAL EXHIBITION,
1862. CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

HANCOCK'S INDIA-RUBBER GAS-TUBING.
All sizes, from ¼ in. to 4 in. diameter and upwards.
Also,
HORSE SINGEING APPARATUS, best make, with GAS-BURNERS, COMBS, and INDIA-RUBBER TUBING, all complete.
INDIA-RUBBER BAGS for GAS-MAINS.
WASHERS for GAS and STEAM JOINTS.
VALVES (pure solid Rubber) for STEAM-ENGINES.
PACKING (Elastic) for STEAM-ENGINES.
FLANGE TUBING, for excluding Draughts and Dust through WINDOWS, DOORS, and GLASS CASES.

Section.
Illustrated Price Lists on application.
JAMES LYNE HANCOCK,
Vulcanized India-Rubber Works,
GOSWELL MEWS, AND 266, GOSWELL ROAD
LONDON, E.C.

Established 1811.
READY & SON,
BILSTON STREET BRASS FOUNDRY,
WOLVERHAMPTON,
MANUFACTURERS OF
SUN BURNERS, GAS CHANDELIERS,
HALL LANTERNS, BRACKETS, PENDANTS,
And every Description of
GAS-FITTINGS,
Including
MEDIÆVAL FITTINGS for CHURCHES, &c.
Large Pattern Books complete, with Book of Prices, 7s. 6d.

D. GRANT & CO.,
GAS-METER MANUFACTURERS.
STATION-METERS ANY SIZE,
PHOTOMETERS, EXPERIMENTAL METERS, &c.
GAS-METER WORKS, CROSSCAUSEWAY,
EDINBURGH.

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Illuminating power rather over	21 sperm candles.
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The actual working, as reported by one of the largest gas companies in Yorkshire, gives results still more favourable, viz—

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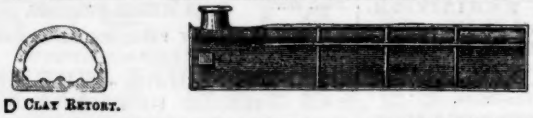

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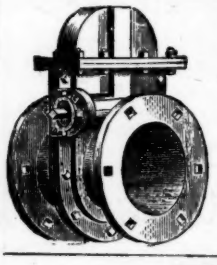

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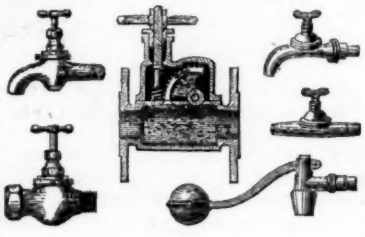

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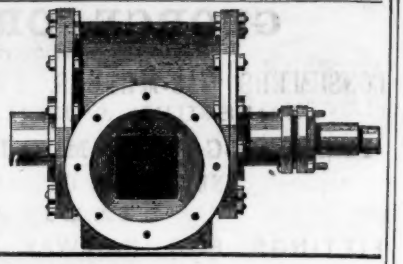

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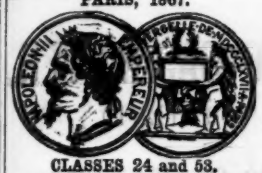
PARIS, 1867.



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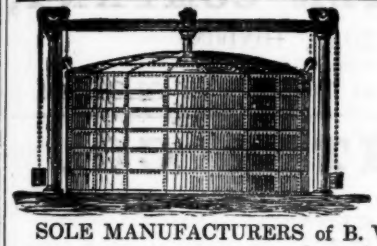

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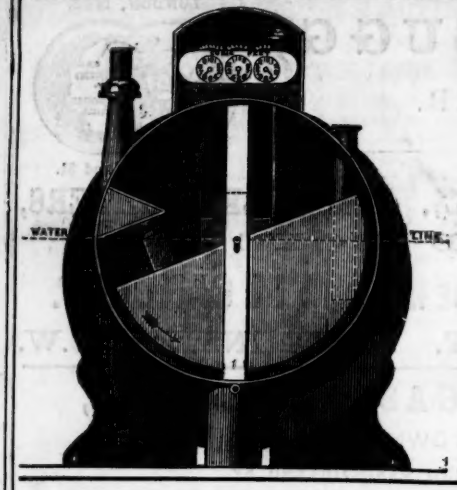

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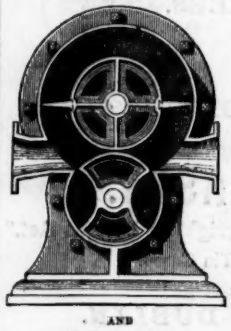

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